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PROGRAM REVIEW. SOUTH PLATTE RIVER BASIN PROJECT (ENFORCEMENT)

Public Health Service
Denver, Colorado

March 1965

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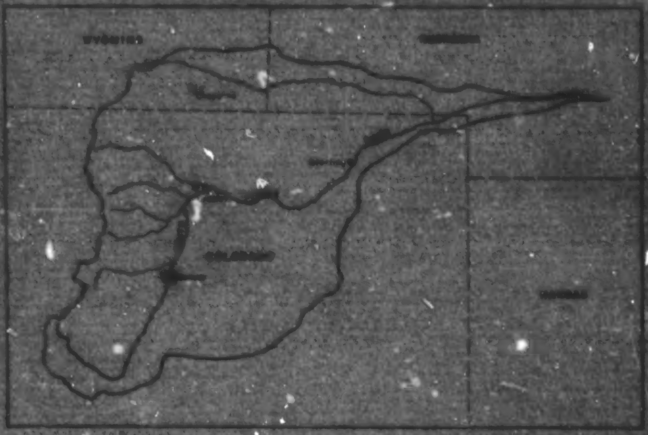
South Platte River Basin Project

PROGRAM REVIEW
SOUTH PLATTE RIVER BASIN PROJECT



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DENVER, COLORADO

MARCH 1965

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PROGRAM REVIEW

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SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Division of Water Supply and Pollution Control
Region VIII
Denver, Colorado

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INTRODUCTION

This ~~document~~ Study represents a reply to a request for certain information to be presented at an annual Program Review of the South Platte River Basin Project on April 6, 1965. It contains information relative to budget, personnel, and administrative and operational procedures encountered or likely to be encountered during Project life. This document is not to be distributed without prior approval from competent authority.

I. GENERAL PROJECT INFORMATION

SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

PROJECT LOCATION:

Headquarters

Location:
804 Equitable Building
17th and Stout Streets
Denver, Colorado

Mailing Address:
South Platte River Basin Project
DWSPC, PHS, Region VIII, DHEW
Room 551, 621 - 17th Street
Denver, Colorado 80202

Telephone:
Local: 297-4138/4139/4130
FTS: Area Code 303, 297-4138/4139/4130

Laboratory Unit

Location:
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4210 E. 11th Avenue
Denver, Colorado

Mailing Address:
South Platte River Basin Project Laboratory
Colorado State Department of Public Health
4210 E. 11th Avenue
Denver, Colorado 80220

Telephone:
Local: 388-5801, Extension 281
FTS: Area Code 303, 388-5801, Extension 281

First, Second and Third Order of Command:

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Project Director

Edmund J. Struzeski, Jr.
Chief, Pollution Damage Assessment Unit

Edward V. Fitzpatrick
Chief, Pollution Control Unit

Laboratory Unit

Robert H. Bordner
Deputy Chief

Leo T. McCarthy
Chief Chemist

SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

Project Authorized: FY1964

Project Begun: October 1963

Project Description:

1. Impetus for Start of Project - On July 18, 1963 the Governor of Colorado requested the Secretary of Health, Education, and Welfare to assist in surveying sources of pollution and quality of water in the South Platte River Basin in the State of Colorado and to assist in abating this pollution under Section 8 of the Federal Water Pollution Control Act.

   The Secretary convened a Conference in this matter which was held in Denver at the House Chambers, State Capitol Building, on October 29, 1963. The conferees designated by the First Session of the Conference were Mr. Murray Stein, Chief, Enforcement Branch, DHEW, PHS, Washington; Mr. Lester M. Klashman, Regional Program Director, DWSPC, Region VIII, Denver, and Dr. Roy L. Cleere, Director of Public Health, Colorado State Department of Public Health, Denver. It was established at this Conference that the South Platte River Basin Study would be undertaken by the facilities of the Public Health Service. The findings and recommendations are to be developed by joint effort of the South Platte River Basin Project and the Colorado State Department of Public Health. These findings and recommendations will form the basis for pollution abatement action to be carried forth in a reasonable time schedule by the State Health Department.

2. Long-Range Goals - The long-range goals and objectives of the Project as were given in the Summary of the First Session of the "Conference in the matter of Pollution of the South Platte River Basin" are as follows:

   a. To determine the legitimate water uses and locate the sources of pollution having an adverse effect on these uses.
   b. Through field investigations determine the physical, chemical and biological responses of the River to pollution and evaluate the previously located sources of pollution with respect to the conditions in the River.
   c. To compute the wasteload reductions necessary to obtain desired water quality and recommend the water quality control measures needed to effect the desired wasteload reductions.

A preliminary pollution abatement schedule will be developed in coordination with the Colorado State Department of Public Health and presented in the latter part of FY1965 for the Denver Metropolitan Area. Similar schedules will be presented in FY1966 for the area north of Denver to and including the Cache la Poudre River watershed, and in FY1967 for the remainder of the Basin. The Project program for providing desirable water quality throughout the Basin will be presented in final form in the early part of FY1968. The step-by-step approach in developing abatement schedules as described above will enable the State of Colorado to anticipate and incorporate necessary waste reduction measures at the earliest possible time in areas where the problem of water quality deterioration is determined to be most critical.

3. Plan of Attack - The achievement of the long-range goal of improved water quality hinges upon development of appropriate pollution abatement schedules, and assistance given by the Project beforehand to various State agencies so that they may anticipate and understand the importance of the various items to be recommended.

Technical information on the magnitude and significance of present problems in water quality and pollution control will be made available at the earliest possible time to the agencies with direct pollution control responsibilities so that the latter groups will become immediately aware of the program alternatives available to correct existing problems. This will lead to decisions to undertake action to improve quality on an interim basis before formal presentation of the abatement schedules are made at the Conference or other meetings. Thereby, adequate waste controls and planning may be effectively initiated at the earliest date and carried forth in full measure.

Each of the Project activities is designed to provide specific data not presently available in a critical problem area, and the completed Project program will bring together the various interests into a unified plan for waste control in the Basin.

CONSULTANTS AND COMMITTEES

During FY1965, the Project utilized the services of two consultants outside the Public Health Service. Consultation has also been provided by various members of the Robert A. Taft Sanitary Engineering Center in the form of technical assistance for certain phases of Project activities. The assistance provided by Mr. Lowell Keup, Aquatic Biologist, of SEC was particularly helpful in performing field studies following the loss of our Project Biologist in August 1964. The Colorado River Basin Project has provided consultation in certain program activity areas. They have also provided laboratory analyses for heavy metals and radioactivity determinations.

I. Consultants

A. Dr. Robert O. Sylvester, Professor of Sanitary Engineering, University of Washington.

Dr. Sylvester will complete a report by the end of FY1965 concerning the Barr Lake problem.

B. Mr. Harold F. Clark, Bacteriologist, Consultant, WS&PC, Washington, D. C.

Mr. Clark continues in his association with the Project which began prior to his retirement from the PHS. He is retained to advise the Project concerning bacteriological investigations.

C. Mr. Hayse Black, Industrial Wastes Consultant, TA&I Section, Technical Services Branch, SEC.

Mr. Hayse Black, Industrial Wastes Consultant, has provided considerable guidance for the Project industrial waste study.

D. Dr. William M. Ingram, In Charge, Biological, Chemical and Oceanographic Activities, and Mr. Lowell Keup, Aquatic Biologist, TA&I Section, TSB, SEC.

These two gentlemen have reviewed and critically analyzed the Project biological program. Mr. Keup has been actively engaged in this program.

E. Mr. John Fairall, Chemical Engineering Consultant, TA&I Section, TSB, SEC.

Mr. Fairall has rendered assistance to Project personnel particularly concerning the in-plant studies pertaining to sugar beet mill investigations.

F. Mr. F. W. Kittrell, TA&I Section, TSB, SEC.

Mr. Kittrell has provided overall guidance to the Project in many activities.

II. Technical Committee

Although a formal Technical Committee has not been organized for the Project, many meetings have been conducted with responsible officials in State, County and Municipal government. At these meetings and conferences, the progress of Project activities has been reviewed, significant events discussed, and the Project has received considerable assistance in fulfilling its objectives.

The TA&I Section of the Technical Services Branch has met on many occasions with Project personnel in both Denver and Cincinnati in order to provide technical assistance and guidance for Project activities. This arrangement has proved highly beneficial to the Project, and the assistance of this Section is gratefully acknowledged.

Although the Project's relations with Headquarters in Washington, D. C., have been confined largely to policy, administrative and personnel matters, the response to Project requests and problems has been very satisfactory.

III. Cooperating Agencies

In addition to the general guidance and policy matters discussed at meetings described in the preceding section, the Project has established direct working relationships with various State, Federal and local agencies situated in the study area. In all areas, the degree of cooperation and coordination received from these organizations was excellent. Particular emphasis should be placed on the support received from the agencies indicated below:

A. Colorado State Department of Public Health

There is no question that the Project has derived a high degree of cooperation from this agency. The Department files, which have been made readily available, have provided excellent background material. The personnel from this office have given considerable assistance in planning and carrying out Project programs. The Department provided space in its building for the Project Laboratory. Generally, Project programs are developed in close coordination with this organization.

B. Metropolitan Denver Sewage Disposal District No. 1

This agency has been most helpful in providing Project personnel with design data for their facilities and information concerning current planning.

C. Department of Public Works, City and County of Denver

This Department has furnished the Project a large amount of data and assistance concerning the sewage systems and treatment works in Denver. The Project Industrial Waste Investigation activities in Denver were coordinated with this organization.

D. Department of Health and Hospitals, City and County of Denver

The Project received valuable assistance from this

Department in planning and carrying out studies concerning discharges from storm sewers and miscellaneous outfalls in Denver.

E. Tri-County Health Department

This agency has cooperated fully with the Project concerning many activities in Adams and Arapahoe Counties. They have provided the Project with a large amount of assistance in the collection of samples for the Municipal Water Supply Evaluation program.

F. The Great Western Sugar Company

The relationship between the Project and this industry has been excellent and is discussed in detail in the Appendix.

G. USPHS, CDC, Greeley, Colorado

This Federal agency has cooperated fully with the Project in the planning, execution and report of the Insect Vector Study.

Many other agencies furnish the Project with information vital to the complete interpretation of the data and in turn request information concerning Project activities and advice. Among these are the following:

Colorado State Engineer's Office, Denver, Colorado
Colorado Inter-County Regional Planning Commission, Denver, Colorado
Jefferson County Health Department, Lakewood, Colorado

Adams County Agricultural Extension Service, Brighton, Colorado

U. S. Geological Survey, Denver, Colorado

U. S. Bureau of Reclamation, Denver Development Office

U. S. Public Health Service, Communicable Disease Center, Greeley, Colorado

Wildlife Research Center, Department of the Interior, Denver Colorado

Federal Correctional Institution, Englewood, Colorado

Rocky Mountain Arsenal, Department of the Army, Denver, Colorado

Black & Veatch, Consulting Engineers for the City and County of Denver, Colorado

In conclusion, mention should be made of the various municipal and district water supply and sewage systems, too numerous to mention, which have provided considerable assistance in support of Project activities.

ACTIVITIES AND ACCOMPLISHMENTS THROUGH FY1965

DESCRIPTION OF PROGRAM ACTIVITIES

1. Industrial Waste Investigations

This phase of Project activities has been conducted in the Metro Denver area from March 1964 until the present. The objectives of this investigation are to locate and evaluate the major sources of industrial pollution discharging directly to Basin streams and in coordination with the Colorado State Department of Public Health,to recommend suitable pollution abatement schedules for industrial wastes.

The study consists essentially of two broad areas of investigation. Interviews and sampling programs have been conducted in the study area for those industries believed to contribute significant waste loads to Basin streams. Secondarily, a reconnaissance and sampling program was performed in order to locate and evaluate the waste discharges from storm sewer outfalls within Denver. The location of industrial waste discharges to the South Platte River and its tributaries in the Metro Denver area are outlined on pages 15-21. As of March 1, 1965 the field investigations within the Denver area are essentially complete, and the data is being studied.

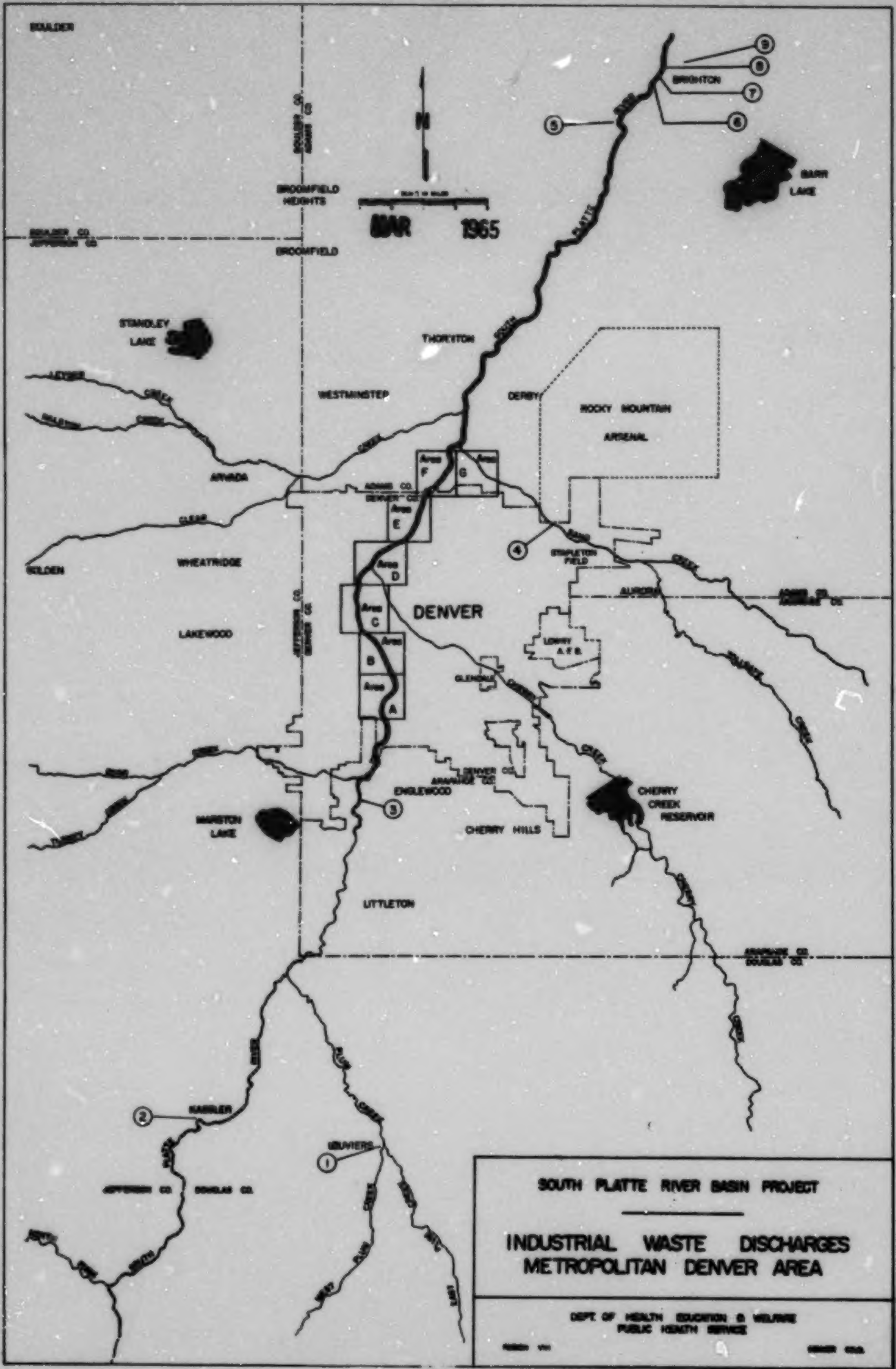
Individual plant reports have been prepared for 67 industrial plants visited in the study area. Sampling programs were conducted at 25 outfalls in 18 of these plants. A total of 77 (24-hour) composite samples and 168 grab samples were collected in this series. The

Project study revealed the industries in the study area are presently discharging the majority of their wastes to municipal sewage treatment plants. However, a number of industrial concerns now discharge all or a portion of their wastes to Basin streams, utilizing either satisfactory, partial or no treatment.

Within the City of Denver there are about 200 storm sewer outfalls which are located along the South Platte River. Many of these drains are used for the disposal of industrial wastes. During the Project study, 77 grab samples were collected from 46 of these outfalls. The results of this program indicated significant amounts of pollutants are being discharged to the River.

The data obtained from the Project industrial waste investigations has been made available to the Colorado State Department of Public Health and that pertaining to the City of Denver has been furnished to the City officials.

It is planned that tentative pollution abatement schedules will be formulated prior to FY1966 in cooperation with the CSDPH for all industrial waste discharged in the Metropolitan Denver area. Industrial waste sampling activities for the remainder of the Basin will be initiated in May 1965 and continued through FY1966.


BOULDER
BOULDER CO.
ADAMS CO.
BROOMFIELD HEIGHTS
BOULDER CO.
JEFFERSON CO.
BROOMFIELD
N
BRIGHTON
①
②
③
④
⑤
⑥
⑦
⑧
⑨
BARR LAKE
PLATTE
SOUTH
STANDLEY LAKE
THORNTON
WESTMINSTER
DERBY
ROCKY MOUNTAIN ARSENAL
ARVADA
CLEAR CREEK
GOLDEN
WHEATRIDGE
LAKEWOOD
ADAMS CO.
DENVER CO.
Area A
Area B
Area C
Area D
Area E
Area F
Area G
DENVER
STAPLETON FIELD
SAND CREEK
AURORA
ADAMS CO.
ARAPAHOE CO.
LOWRY A.F.B.
GLENDALE
CHERRY CREEK
TOLLGATE CREEK
BEAR CREEK
TURKEY CREEK
MARSTON LAKE
ENGLEWOOD
DENVER CO.
ARAPAHOE CO.
CHERRY HILLS
CHERRY CREEK RESERVOIR
LITTLETON
ARAPAHOE CO.
DOUGLAS CO.
JEFFERSON CO.
DOUGLAS CO.
KASSLER
LOUVIERS
PLUM CREEK
SOUTH PLATTE RIVER
NORTH FORK
WEST PLUM CREEK
EAST PLUM CREEK

MAR 1965

SOUTH PLATTE RIVER BASIN PROJECT

INDUSTRIAL WASTE DISCHARGES
METROPOLITAN DENVER AREA

DEPT. OF HEALTH EDUCATION & WELFARE
PUBLIC HEALTH SERVICE

REGION VIII

DENVER COLO.

FIGURE. 1

1421

GPO 848-143

TABLE I

LOCATION OF INDUSTRIAL WASTE DISCHARGES METROPOLITAN DENVER AREA

Map Identification No.	Source	Type of Industry	River Mileage
1.	E. I. DuPont de Nemours	Explosives Mfg.	329.3/6.3
2.	Martin - Denver	Missile Mfg.	324.6/0.4
3.	Storm Sewer	--	319.7
4.	Denver Storm Sewer	Aircraft	306.8/4.3
5.	Gates-Cyclo	Egg Production	293.5
6.	Kuner-Empson	Cannery	288.6/0.4
7.	Kuner-Empson	Cannery	289.4
8.	Kuner Empson	Cannery	288.6/0.4
9.	Great Western Sugar Co. (Brighton)	Sugar Beet	
10.	Denver Storm Sewer	--	317.4
11.	Denver Storm Sewer	--	317.1
12.	Denver Storm Sewer	--	317.1
13.	Denver Storm Sewer	--	317.0
14.	Denver Storm Sewer	--	316.4
15.	Denver Storm Sewer	--	316.5
16.	Denver Storm Sewer	--	316.1
17.	Denver Storm Sewer	--	315.9
18.	Denver Storm Sewer	--	315.6
19.	General Chemical Co.	Sulfuric Acid Mfg.	315.4
20.	General Chemical Co.	" " "	315.3

Table I (Continued)

Location of Industrial Waste Discharges - Metro Denver Area

Map Identification No.	Source	Type of Industry	River Mileage
21.	General Chemical Co.	Sulfuric Acid Mfg.	315.3
22.	General Chemical Co.	" " "	315.3
23.	General Chemical Co.	" " "	315.2
24.	Denver Storm Sewer	--	314.6
25.	Denver Storm Sewer	--	314.4
26.	Denver Storm Sewer	--	314.4
27.	Denver Storm Sewer	--	314.2
28.	Denver Storm Sewer	--	314.2
29.	Denver Storm Sewer	--	313.7
30.	Public Service Co. - Zuni	Utility	313.7
31.	Denver Storm Sewer	--	313.5
32.	Denver Storm Sewer	--	313.5
33.	Denver Storm Sewer	--	313.4
34.	Denver Storm Sewer	--	313.4
35.	Denver Storm Sewer	--	313.0
36.	C&S Railroad	Railroad	312.8
37.	C&S Railroad	Railroad	312.7
38.	C&S Railroad	Railroad	312.7
39.	Denver Storm Sewer	--	312.7
40.	Denver Storm Sewer	--	311.9
41.	Denver Storm Sewer	--	311.8
42.	Denver Storm Sewer	--	311.8

Table I (Continued)

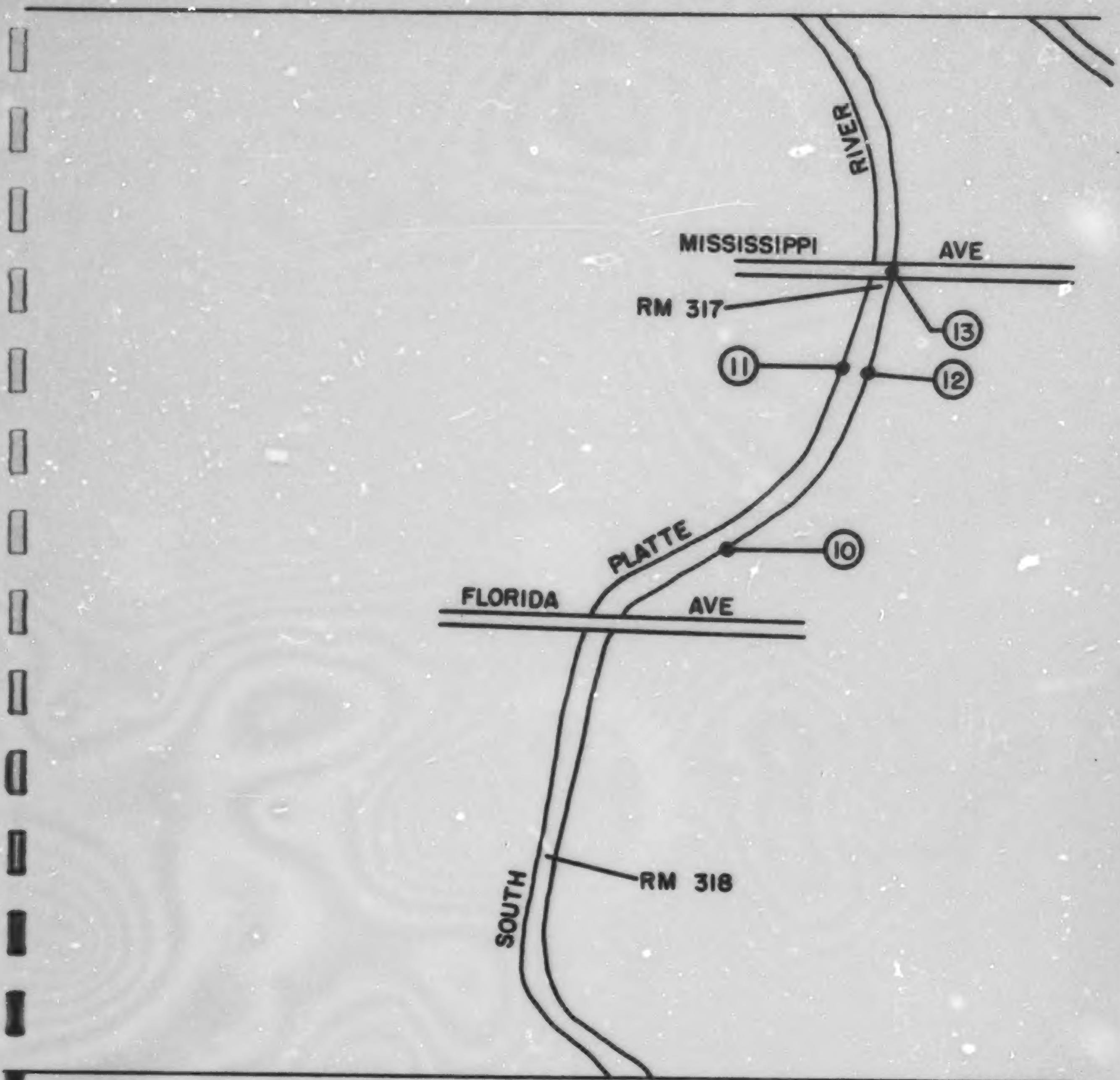
Location of Industrial Waste Discharges - Metro Denver Area

Map Identification No.	Source	Type of Industry	River Mileage
43.	Denver Storm Sewer	--	311.8
44.	Denver Storm Sewer	--	311.7
45.	Denver Storm Sewer	--	311.3
46.	Denver Storm Sewer	--	311.2
47.	CB&Q Railroad	Railroad	311.1
48.	Denver Storm Sewer	--	311.1
49.	Denver Storm Sewer	--	311.0
50.	Denver Storm Sewer	--	311.0
51.	Denver Storm Sewer	--	310.9
52.	Denver Storm Sewer	--	310.9
53.	Denver Storm Sewer	--	310.9
54.	Denver Storm Sewer	--	310.7
55.	Denver Storm Sewer	--	310.5
55A.	Denver Storm Sewer	--	310.4
56.	Denver Storm Sewer	--	310.4
57.	Denver Storm Sewer	--	310.2
58.	Denver Storm Sewer	--	310.0
59.	Denver Storm Sewer	--	309.8
60.	Denver Storm Sewer	--	309.6
61.	Denver Storm Sewer	--	309.6
62.	Denver Storm Sewer	--	309.5
63.	Armour & Co.	Meat Packer	309.4
64.	Armour & Co.	Meat Packer	309.4

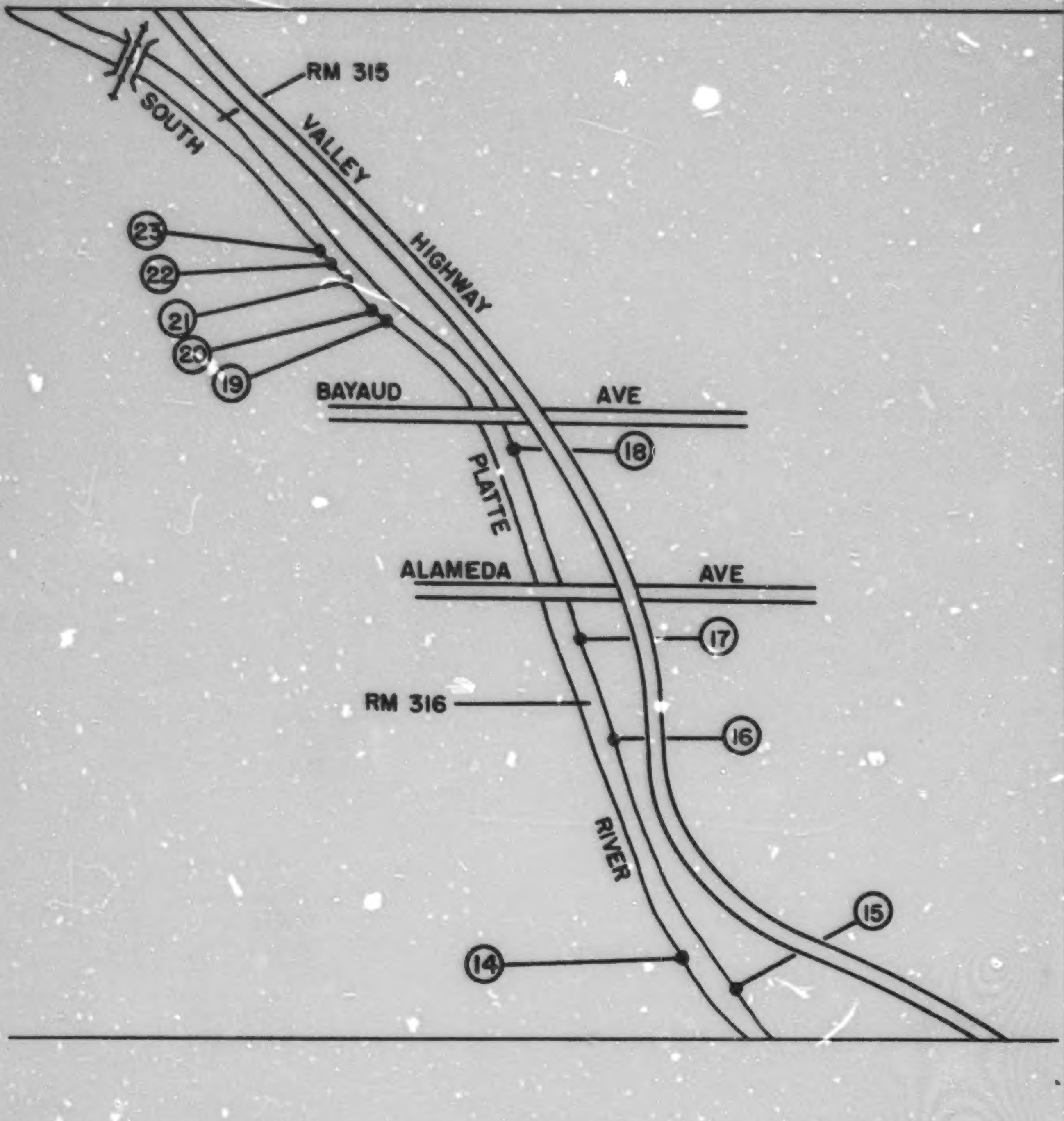
Table I (Continued)

Location of Industrial Waste Discharges - Metro Denver Area

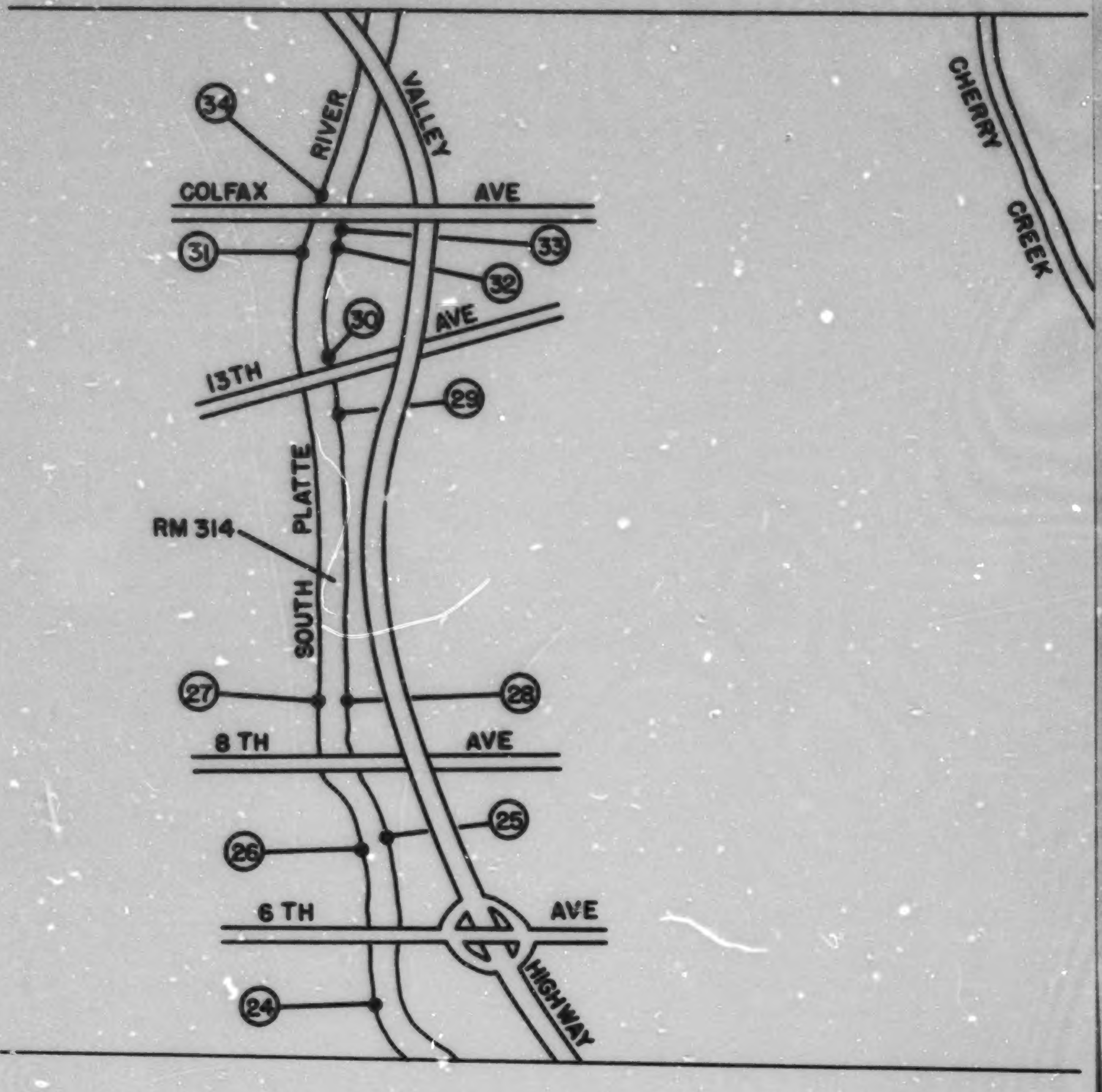
Map Identification No.	Source	Type of Industry	River Mileages
65.	Denver Union Stockyards	Stockyards - Cattle	309.4
66.	Wilson & Co.	Meat Slaughterhouse	309.3
67.	Denver Union Stockyards	Stockyards - Hogs	309.2
68.	Wilson & Co.		309.2
69.	Denver Union Stockyards	Stockyards - Sheep	309.2
70.	Denver Storm Sewer	--	309.0
71.	Denver Union Stockyards	Stockyards - Cattle	308.9
72.	Capitol Rendering	Meat Rendering	308.0
73.	Packaging Corp. ofAmerica	Paper Mill	307.8
74.	Litvak Meat	Meat Slaughterhouse	307.6
75.	Continental Oil Co.	Refinery	308.6/1.1
76.	Tenneco Oil Co.	Refinery	306.8/0.9
77.	Empire Petroleum	Refinery	306.8/1.1
78.	Oriental Refining Co.	Refinery	306.8/1.8


RIVER
MISSISSIPPI
AVE
RM 317
13
11
12
PLATTE
10
FLORIDA
AVE
RM 318
SOUTH

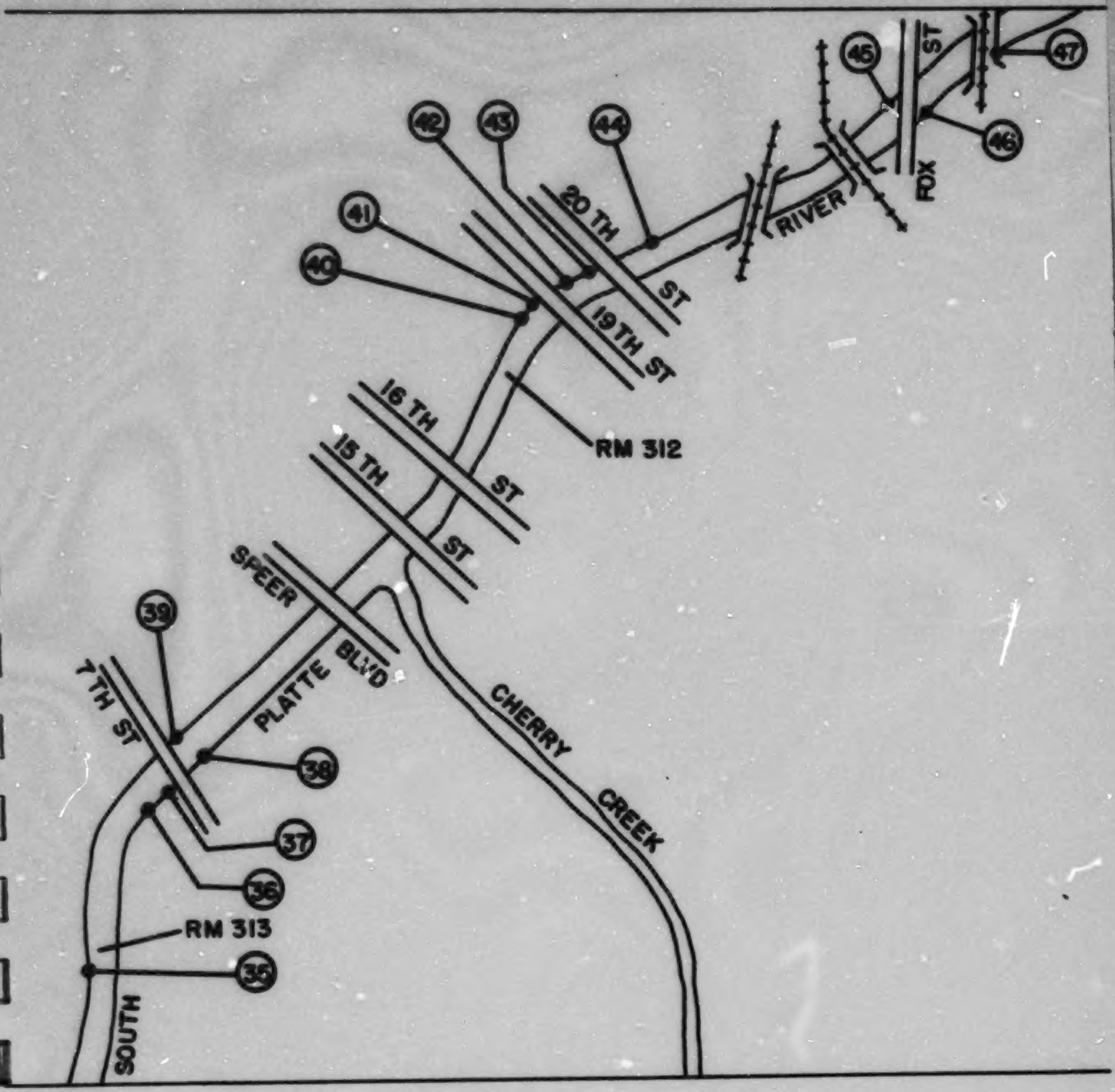
Area A, Figure 1


RM 315
SOUTH
VALLEY
HIGHWAY
23
22
21
20
19
BAYAUD
AVE
18
PLATTE
ALAMEDA
AVE
17
RM 316
16
RIVER
15
14

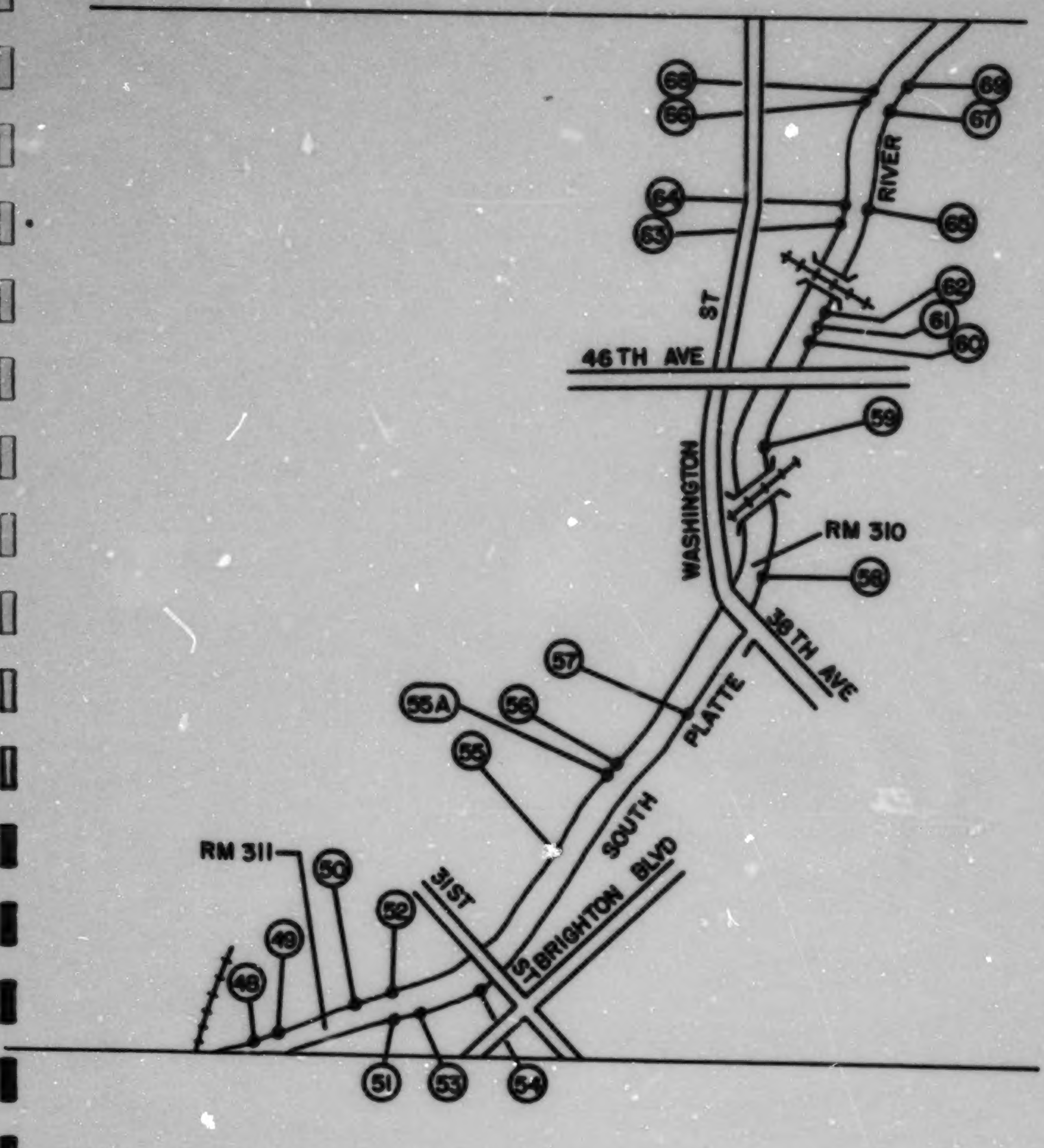
Area B, Figure 1


34
RIVER
VALLEY
CHERRY
CREEK
COLFAX
AVE
31
33
32
30
AVE
13TH
29
PLATTE
RM 314
SOUTH
27
28
8 TH
AVE
25
26
6 TH
AVE
HIGHWAY
24

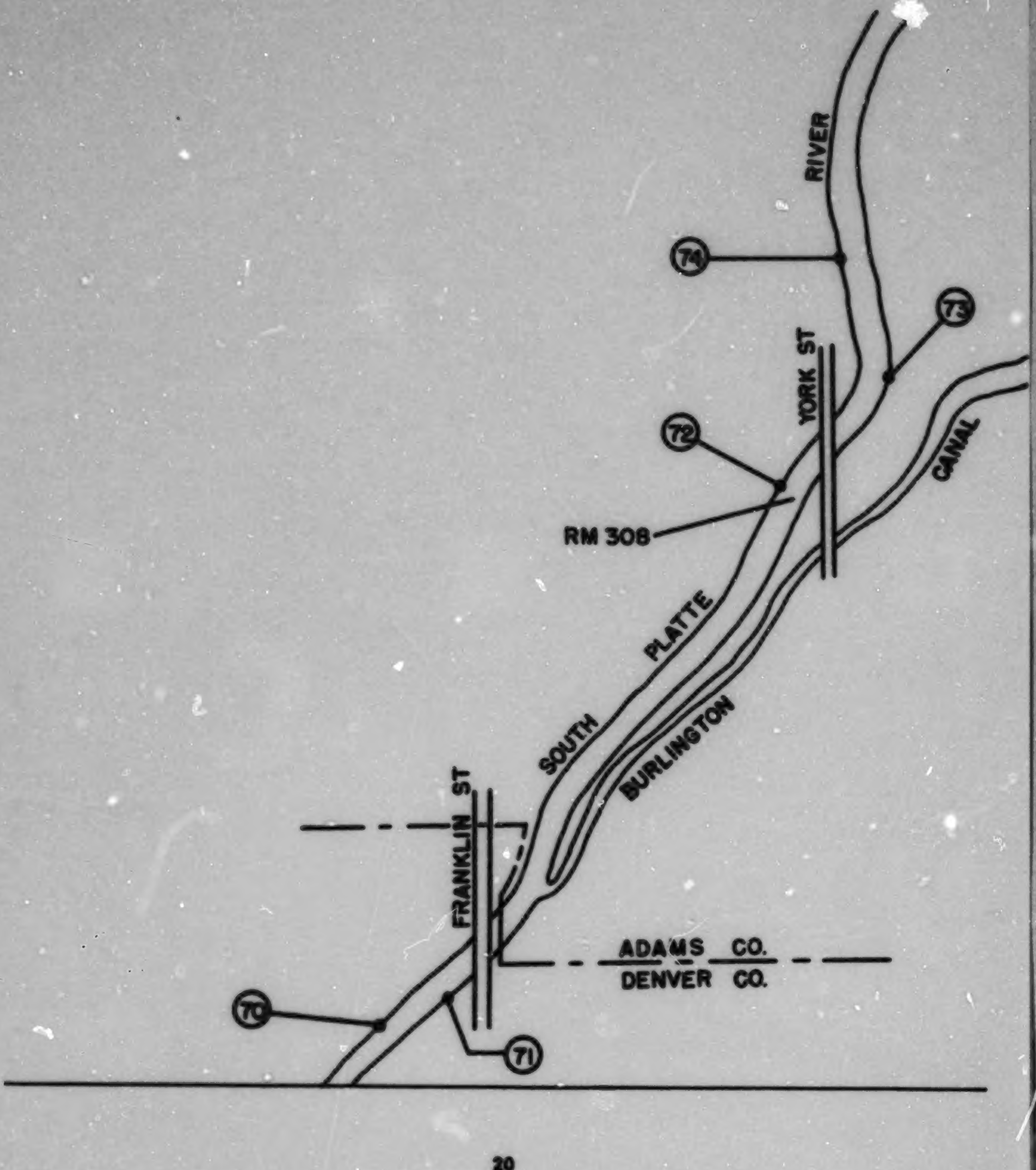
Area C, Figure 1


42
43
44
45
47
46
ST
FOX
RIVER
20 TH
ST
41
40
19 TH
ST
RM 312
16 TH
ST
15 TH
ST
SPEER
BLVD
39
7 TH ST
PLATTE
38
37
36
RM 313
35
SOUTH
CHERRY
CREEK

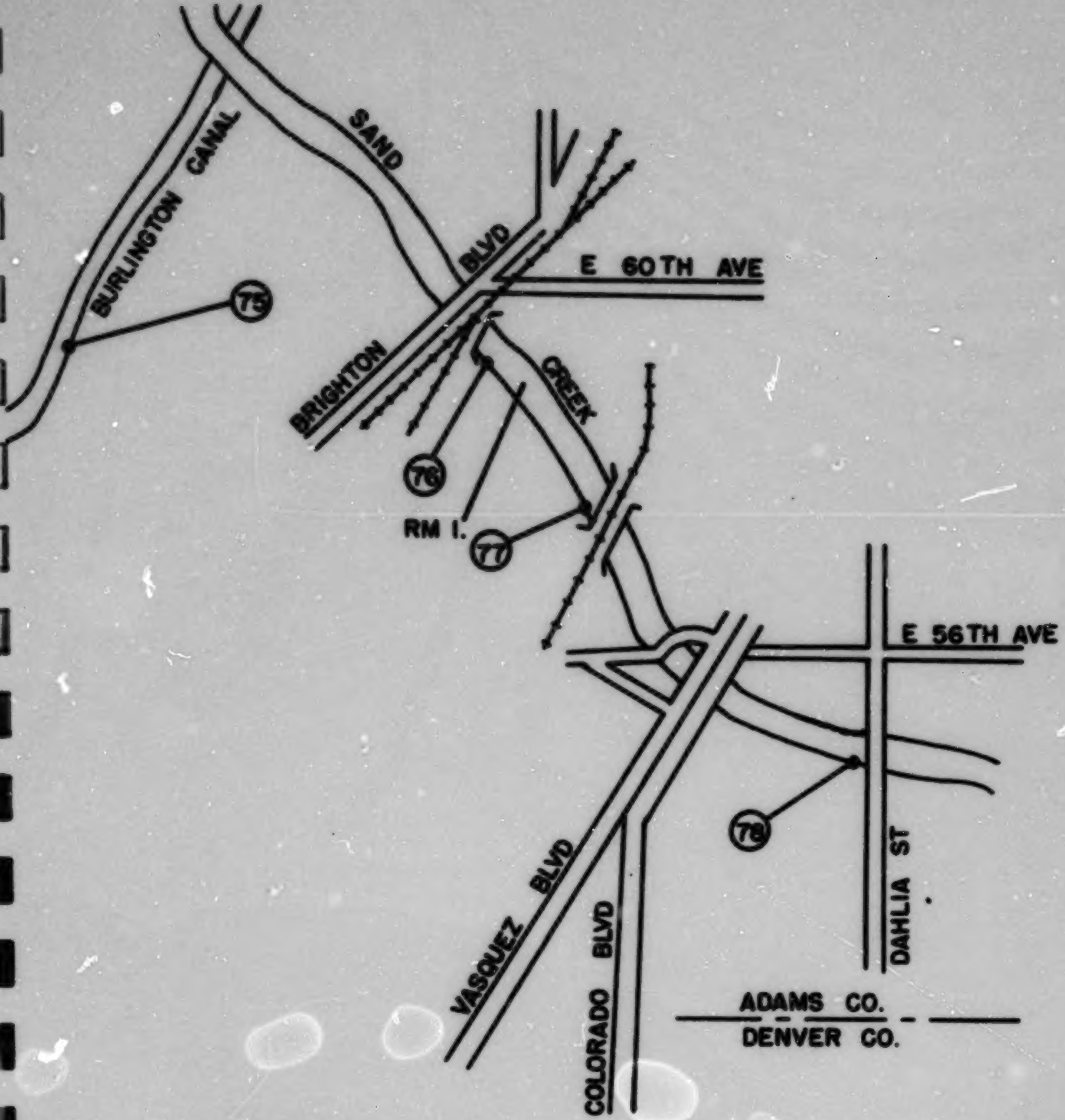
Area D, Figure 1


68
66
69
67
64
63
RIVER
65
ST
62
61
60
46TH AVE
59
WASHINGTON
RM 310
58
38TH AVE
57
55A
56
PLATTE
55
SOUTH
RM 311
50
31ST
BRIGHTON BLVD
52
ST
49
48
51
53
54

Area E, Figure 1


RIVER
74
73
YORK ST
72
CANAL
RM 308
PLATTE
SOUTH
BURLINGTON
FRANKLIN ST
ADAMS CO.
DENVER CO.
70
71

Area F, Figure 1


BURLINGTON CANAL
75
SAND
CREEK
BRIGHTON
BLVD
E 60TH AVE
76
RM I.
77
E 56TH AVE
78
VASQUEZ BLVD
COLORADO BLVD
DAHLIA ST
ADAMS CO.
DENVER CO.

Area G, Figure I

2. Municipal Waste Investigations

The purpose of this study was to determine the pollutional loading from municipal sewage treatment plants in the Metropolitan Denver area and in coordination with the Colorado State Department of Public Health, to recommend adequate pollution abatement schedules. The field work in this program was conducted during March through December 1964. In this phase of the Project, each treatment facility was evaluated and sampling programs were conducted at 20 plants by Project personnel. The Metropolitan Denver Sewage Disposal District #1 treatment facilities, currently under construction, were also studied. As a result of this work, waste loadings were calculated for 23 treatment plants which discharge to Basin streams. Four of the plants in this group receive significant amounts of industrial wastes in addition to domestic loading. As a result of detailed studies conducted in cooperation with the Project industrial waste section, an estimate of industrial waste loading was developed for these plants. The location of municipal waste treatment plants in the Metro Denver area is shown on the following pages.

It was determined that five plants of the 23 treatment works considered were adequate and in conformity with the State effluent standards. Two plants were considered marginal and engineering studies are recommended. Nine plants were judged to be currently committed to a satisfactory program of pollution abatement. The remaining seven plants were found not to be in conformity with the State effluent standards and not committed to a definite program for pollution abatement.

The first draft report of this phase of Project activities was submitted to Headquarters on March 1, 1965 for review. Recommended pollution abatement schedules with a completion date of January 1, 1967 are contained in this report.

The field work in conjunction with municipal waste investigations for the remainder of the Basin is scheduled to begin May 1, 1965. This work will be completed in FY1966 and the final report completed early in FY1967.

TABLE

LOCATION OF MUNICIPAL SEWAGE TREATMENT PLANTS IN THE METRO DENVER AREA

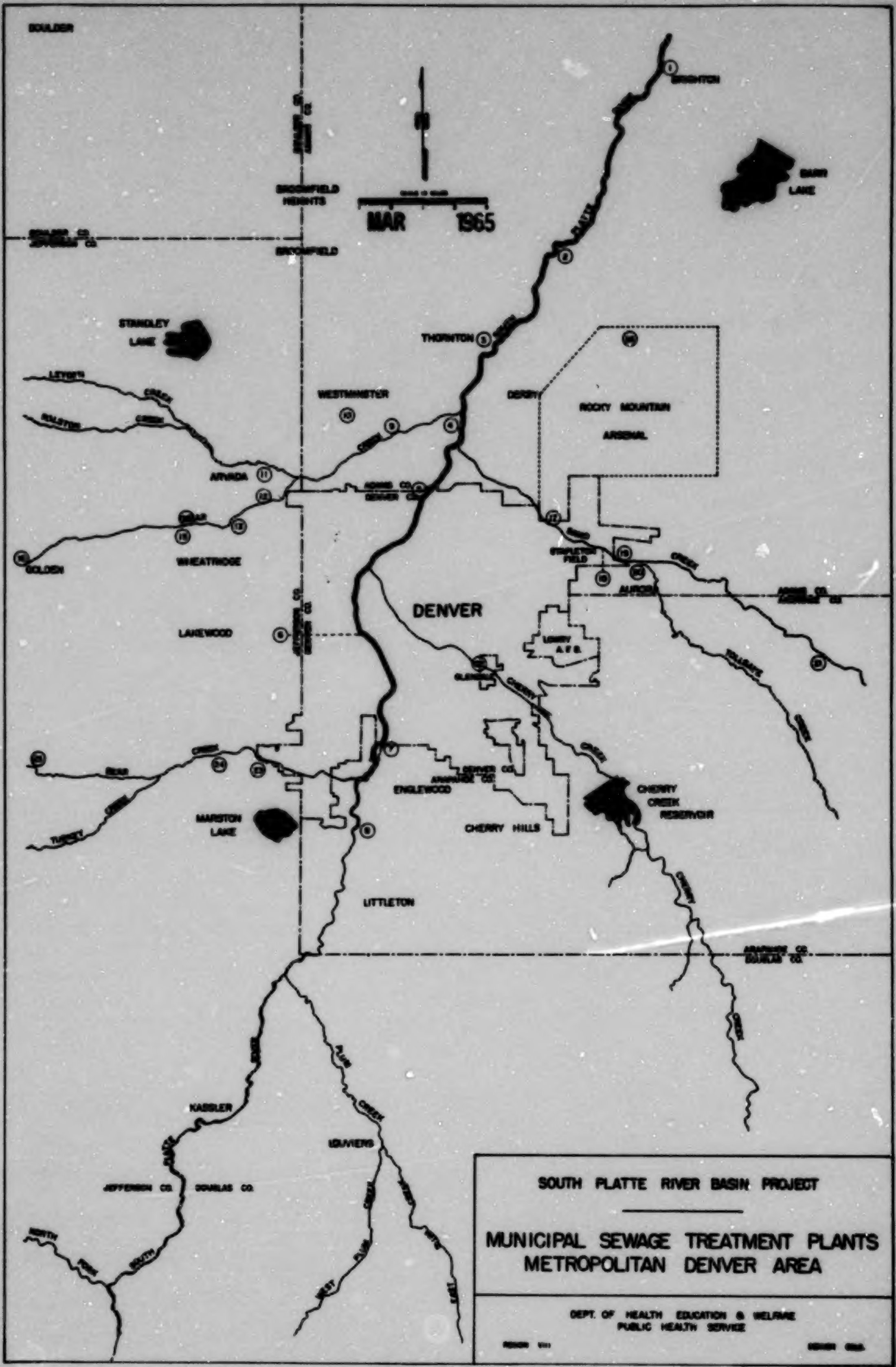
Map Ident. No.	Facility	River Mileage	Type Treatment
1	City of Brighton	289.5	Secondary
2	S. Adams Water & San. District	301.2	Secondary
3	City of Thornton	303.5	Secondary
4	N. Washington Water & San. Dist.	305.5	Intermediate
5	Denver-Northside	308.8	Primary
6	S. Lakewood San. District	314.1/2.1 W	Secondary
7	City of Englewood	319.7	Secondary
8	City of Littleton	323.5	Secondary
9	Baker Water & San. District	305.5/3.0	Secondary
10	City of Westminster	305.5/3.6/1.6	Primary
11	City of Arvada	305.5/6.2/0.3	Secondary
12	Clear Creek Valley San. District	305.5/7.0	Secondary
13	City of Wheatridge	305.5/7.5	Secondary

LOCATION OF MUNICIPAL SEWAGE TREATMENT PLANTS IN THE METRO DENVER AREA
(continued)

Map Ident. No.	Facility	River Mileage	Type Treatment
14	Fruitdale San. District	305.5/10.0	Primary
15	N. W. Lakewood San. District	305.5/10.2	Primary
16	City of Golden	305.5/15.5	Secondary
17	Denver-Eastside	306.8/4.7	Primary
18	City of Aurora - Main	306.8/5.5/1.1 S	Secondary
19	City of Aurora - Altura	306.8/6.8	Secondary
20	Fitzsimons Hospital	306.8/6.9/0.9	Secondary
21	Buckley Air Station	306.8/11.9	Secondary
22	City of Glendale	(a)	Secondary
23	Colorado State Industrial School for Girls	(a)	Secondary
24	Federal Correctional Institution	320.9/5.5	Intermediate
25	City of Evergreen	320.9/19.3	Intermediate
26	Rocky Mountain Arsenal	(b)	Intermediate

(a) Plant discharge to oxidation pond, no effluent

(b) Discharges to First Creek, thence to Burlington Canal. Does not enter South Platte River


BOULDER
BRIGHTON
BARR LAKE
BROOMFIELD HEIGHTS
MAR 1965
BOULDER CO.
JEFFERSON CO.
BROOMFIELD
PLATTE
STANDLEY LAKE
THORNTON
DERBY
ROCKY MOUNTAIN ARSENAL
WESTMINSTER
ARVADA
ADAMS CO.
DENVER CO.
STAPLETON FIELD
AURORA
GOLDEN
WHEATRIDGE
DENVER
LAKEWOOD
LOWRY A.F.B.
GLENDALE
CHERRY CREEK
SAND CREEK
TOLLGATE CREEK
BEAR CREEK
TURKEY CREEK
ENGLEWOOD
DENVER CO.
ARAPAHOE CO.
MARSTON LAKE
CHERRY HILLS
CHERRY CREEK RESERVOIR
LITTLETON
ARAPAHOE CO.
DOUGLAS CO.
KASSLER
LOUVIERS
PLUM CREEK
JEFFERSON CO.
DOUGLAS CO.
NORTH FORK
SOUTH PLATTE
WEST PLUM CREEK

SOUTH PLATTE RIVER BASIN PROJECT

MUNICIPAL SEWAGE TREATMENT PLANTS METROPOLITAN DENVER AREA

DEPT. OF HEALTH EDUCATION & WELFARE
PUBLIC HEALTH SERVICE

REGION VIII

DENVER COLO.

24-a

GPO 847-389

3. Municipal Water Supply Evaluation

The objective of this program is to investigate the quality of selected municipal water supplies in the Metropolitan Denver area which utilize sources of supply that may be subject to contamination. These sources of supply include the shallow ground water aquifer in the North Denver area, the direct withdrawal of water from Clear Creek, and use of infiltration facilities on Clear Creek and the South Platte River. A total of six systems operating municipal water supplies was studied during the period August 1964 to the present.

This work consisted of an examination of the sources of supply, treatment facilities and the operating procedures of each system. A series of samples was collected from each source for chemical analyses. A bacteriological sampling survey was also conducted for four supplies which may have critical water quality problems. These samples were collected on a weekly basis for four months, starting in September 1964, and consisted of raw water, treated, and distribution water.

Although the results of this sampling program did not appear to indicate excessive contamination to be present, it is believed that the summer period is much more critical for these supplies. Since the Project laboratory will be unable to support a program of this magnitude during the summer of 1965, the CSDPH and the Tri-County Health Department will be encouraged to undertake a sampling study during this period.

An examination of the chemical analyses indicated that several sources of public supply derived from the shallow ground water aquifer in the North Denver area contained excessive amounts of ABS, oil and/or nitrates.

It is evident that a potential hazard exists for certain supplies which were studied, based upon the probability of decreased detention during the summer months, breakdown and bypass of some portions of treatment facilities during this period of high demand and a continued increase of pollution in the ground water sources. It appears that a metropolitan concept for public water supply will provide the best solution for the continued expansion of the Metro Denver area.

Studies will be initiated in May 1965 to consider municipal water supply problems in the middle portion of the Basin. This work, together with possible further bacteriological sampling in the Metro Denver area, will continue into FY1966.

4. Barr Lake Study

The objectives of the Barr Lake study are: a) to determine the present level of pollution and degree of objectionable odors associated with irrigation waters stored in Barr Lake; b) to predict the level of pollution in Barr Lake waters after completion of Metropolitan Denver Sewage Disposal District No. 1 secondary treatment facilities; and, c) to determine what measures may be necessary and feasible both before and after completion of MDSDD#1 treatment facilities, to alleviate undesirable conditions in the Lake.

Samples were collected on a bi-weekly basis of the canal water inflow to the lake during spring of 1964. Lake waters were sampled at four locations at selected depths, together with lake outflow waters, on a bi-weekly basis through spring and most of the summer of 1964. Sampling was resumed on canal water inflow in November 1964 and will continue on a bi-weekly basis to early spring 1965. The various water samples above were subjected to chemical, physical, biochemical and bacteriological analyses to determine the full extent of existing water pollution within the Barr Lake system.

Biological studies for plankton enumeration and identification of bottom animals were carried out for Barr Lake from May to August 1964. Staff biologists from the Technical Advisory and Field Investigations Section, DWSPC, SEC, provided major support in this activity.

The Project has served as a focal point for the collection and general array of data received from the Barr Lake program. This summary information has been forwarded to Professor Robert O. Sylvester of the University of Washington who is serving as a consultant to the Project on the Barr Lake program. In January 1965 Professor Sylvester furnished a preliminary report to the Project on Barr Lake. He will provide a final report to the Project in June 1965 after sampling activities are completed.

The preliminary Barr Lake report received from Professor Sylvester contained the following principal conclusions:

a. The primary source of pollution to the lake originates from the Denver Northside sewage treatment plant. The pollution loads are particularly severe at times of low streamflow when the sewage flow exceeds the natural river flow.

b. A septic condition exists in the inflow canal to the lake during a large part of the year.

c. Odor problems may continue to exist in the vicinity of Barr Lake even after the new Denver Metropolitan sewage treatment plant becomes operational. These problems will most likely be present during a period of one to six weeks following ice melt.

5. Feedlot Wastes Evaluation

This program will provide detailed information on the characteristics and volumes of waste discharges from cattle feedlot operations in the South Platte River Basin. Studies are to be undertaken at selected feedlots and attempts will be made to develop a unit waste load factor for application to various feedlots in the Basin. Limited stream surveys will be conducted concurrently with the industrial site studies.

At the end of FY1964 a visit was made to all important feedlots in the Basin. Information was obtained on 40 separate feedlots, which included data on the size of feedlots, the type of operation, techniques employed in manure disposal, types of wastes, layout of the wastewater carriage system, and other factors.

Preliminary planning for detailed field studies at selected feedlots will be undertaken during March and early April 1965. Sampling is expected to commence during April or early May 1965, and will continue throughout FY1966. This activity will be coordinated with the ground water studies activity to determine in addition the extent of ground water aquifer pollution arising from these industrial operations.

6. Vegetable Studies

The Project since its beginning has been concerned with the problem of truck-farm vegetables grown in and around the Denver area, which are irrigated with sewage-laden water and subsequently delivered to the markets for consumption within Denver and other areas. A program of sampling and bacteriological analysis has been carried out both in FY1964 and FY1965 designed to: a) provide further evaluation of the hazard of consuming these vegetables in the raw or uncooked stage; b) to compare vegetables receiving polluted irrigated water with those receiving relatively good quality water; c) to ascertain the varieties of vegetables most susceptible to contamination; d) to determine effect of marketing procedures upon the bacterial quality of vegetable crops.

Activities in FY1964 included: a) the collection and study of all background information relating to bacteriological contamination of crops irrigated with sewage-laden water which would have direct reference to the planned studies; and b) a pilot study comprising sampling and analysis of vegetables, intended to provide a rough picture of bacteriological content of crops. This field study carried out in September 1963 gave strong indication that a potential problem existed and that a concentrated study effort would be required in the summer of 1964 to provide necessary information in this program.

The full-scale vegetable sampling studies were conducted over the period from the end of May to the end of September 1964. Collections were made of vegetables, soils and waters on a weekly basis within the problem area, primarily north of Denver, and the control area, in the vicinity of Longmont, Colorado. Included in this study were eight farms and four control farms. The 1964 investigations involved the collection of 137 vegetable samples, 108 soil samples, and 169 irrigation water samples. Fourteen varieties of vegetables were included in the sampling program. Bacteriological analyses included tests for numerical levels of confirmed and completed coliform, fecal coliform and fecal strep bacteria. A preliminary report on the vegetable study activity of the Project is nearly completed. (It is expected that this draft report will be released for review in early FY1966.) There are no future studies planned by the Project for investigation of vegetables.

The more important of the tentative conclusions formulated by the above report are given as follows. These conclusions are subject to revision.

1. Coliform levels on root crops are higher than for leafy vegetables.
2. There is an increase in coliform levels on root crops during the market preparation.
3. Soil coliform levels on farms using polluted irrigation water are significantly higher than farms using relatively pure irrigation water.
4. The levels of coliform in the polluted irrigation water studied are dramatically higher than in relatively clean irrigation water.
5. Coliform levels on root and leafy crops on farms using polluted irrigation water are higher than for farms using relatively pure irrigation water.
6. Irrigation of vegetables with polluted water should cease at some reasonable period of time before harvest of vegetables, and only adequately-treated or unpolluted water should be used during the pre-harvest period.
7. Presence or absence of hazard from the consumption of vegetable in the raw state which contains fecal organisms must be determined by correlated epidemiological studies with quantitative fecal coliform data.

7. Ground Water Studies

The objectives of ground water studies in the South Platte River Basin are as follows: a) to determine the relation between ground water and surface flows; b) to determine the amounts and use of ground water; c) to assess pollution and contamination of the water-bearing formations; d) to determine what measures may be taken to minimize or eliminate deterioration of chemical quality of ground water.

A study of ground-water conditions between Denver and Brighton, Colorado was made during the summer and fall of 1964. The study included: a) evaluation of published and unpublished hydrogeological and water quality information pertaining to the area; and b) sampling of selected water wells and obtaining first-hand information pertinent to ground-water pollution and contamination in problem areas. Information obtained from feedlots, municipal water supply, municipal wastes, industrial wastes, and stream survey activities of the Project was also utilized in this study.

A draft report presenting the results of the study of ground-water conditions in the area between Denver and Brighton was completed in February 1965 and at the present time is being reviewed for publication. Principal conclusions of the study are as follows:

a. The shallow valley-fill aquifer is the principal source of water for many public supplies in the area and a primary source for numerous irrigation wells.

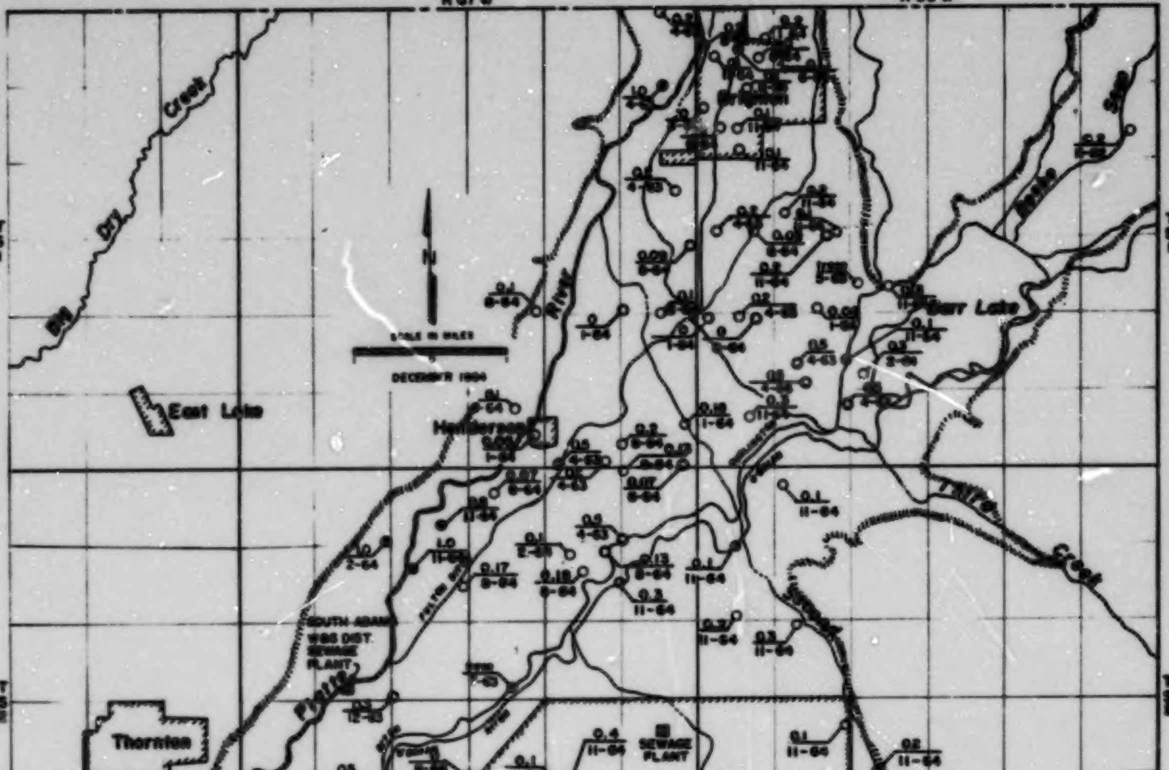
b. The chief source of recharge to the shallow aquifer originates from seepage derived from sewage-laden South Platte River water diverted to the irrigation ditches.

c. The shallow aquifer is very susceptible to pollution and contamination. Widespread ground-water pollution, particularly by ABS and nitrates, exists in the area. (See attached figures.)

d. The shallow aquifer underlying approximately 12 square miles in the vicinity of Rocky Mountain Arsenal is severely contaminated by chemical wastes (see attached figure). This contamination will probably persist for many decades in the future.

During November 1964 a study was made of ground-water pollution in the upper part of the South Platte River Basin south of Denver. The work included an evaluation of data obtained from State and local health agencies and a short field reconnaissance of potential problem areas. The study of ground-water conditions in the remainder of the Denver Metropolitan area is expected to be completed by April 1965. The results of these investigations will be available in early May 1965.

Future ground-water studies in the second study area defined by the Project as the region lying between Brighton and Fort Collins-Greeley, Colorado will have essentially the same objectives stated above. A detailed review and evaluation of existing information and

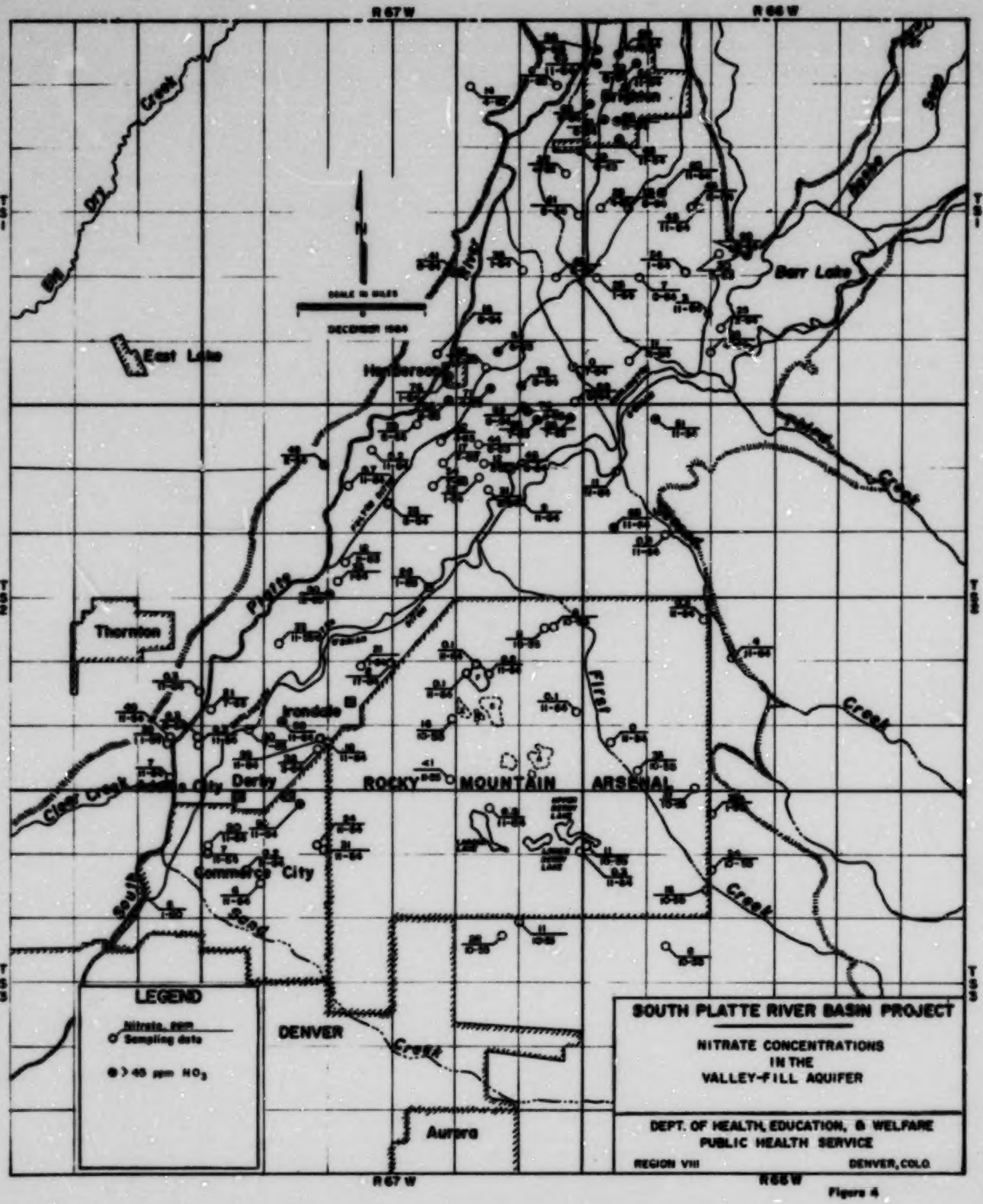

R 67 W
R 66 W
T S 1
T S 2
T S 3
N
SCALE IN MILES
DECEMBER 1964
Big Dry Creek
East Lake
Henderson
Brighton
Barr Lake
River
Platte
Thornton
THORNTON SEWAGE PLANT
SOUTH ADAMS W&S DIST. SEWAGE PLANT
Irondale
Derby
Adams City
NORTH WASHINGTON W&S DIST. SEWAGE PLANT
Commerce City
DENVER NORTH SIDE SEWAGE PLANT
South
Sand
Clear Creek
ROCKY MOUNTAIN ARSENAL
SEWAGE PLANT
First Creek
Second Creek
Third Creek
Box Elder Creek
DENVER
DENVER EAST SIDE SEWAGE PLANT
Sand Creek
AURORA-ALTURA SEWAGE PLANT
AURORA SEWAGE PLANT
Aurora
FITZSIMMONS GENERAL HOSPITAL SEWAGE PLANT
LEGEND
ABS, ppm
Sampling date
> 0.5 ppm ABS
Sewage plant

SOUTH PLATTE RIVER BASIN PROJECT

ALKYL BENZENE SULFONATE
CONCENTRATIONS
IN THE VALLEY-FILL AQUIFER

DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION VIII DENVER, COLO.

Figure 3


R 67 W
R 66 W
T S 1
T S 2
T S 3
Big Dry Creek
East Lake
Brighton
Barr Lake
Box Elder Creek
Second Creek
Third Creek
Henderson
Platte River
Thornton
Irondale
Derby
Adams City
Clear Creek
Commerce City
South Platte
Sand Creek
ROCKY MOUNTAIN ARSENAL
First Creek
DENVER
Aurora
SCALE IN MILES
DECEMBER 1964
N
LEGEND
Nitrate, ppm
Sampling date
● > 45 ppm NO$_3$

SOUTH PLATTE RIVER BASIN PROJECT

NITRATE CONCENTRATIONS
IN THE
VALLEY-FILL AQUIFER

DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION VIII DENVER, COLO.

Figure 4

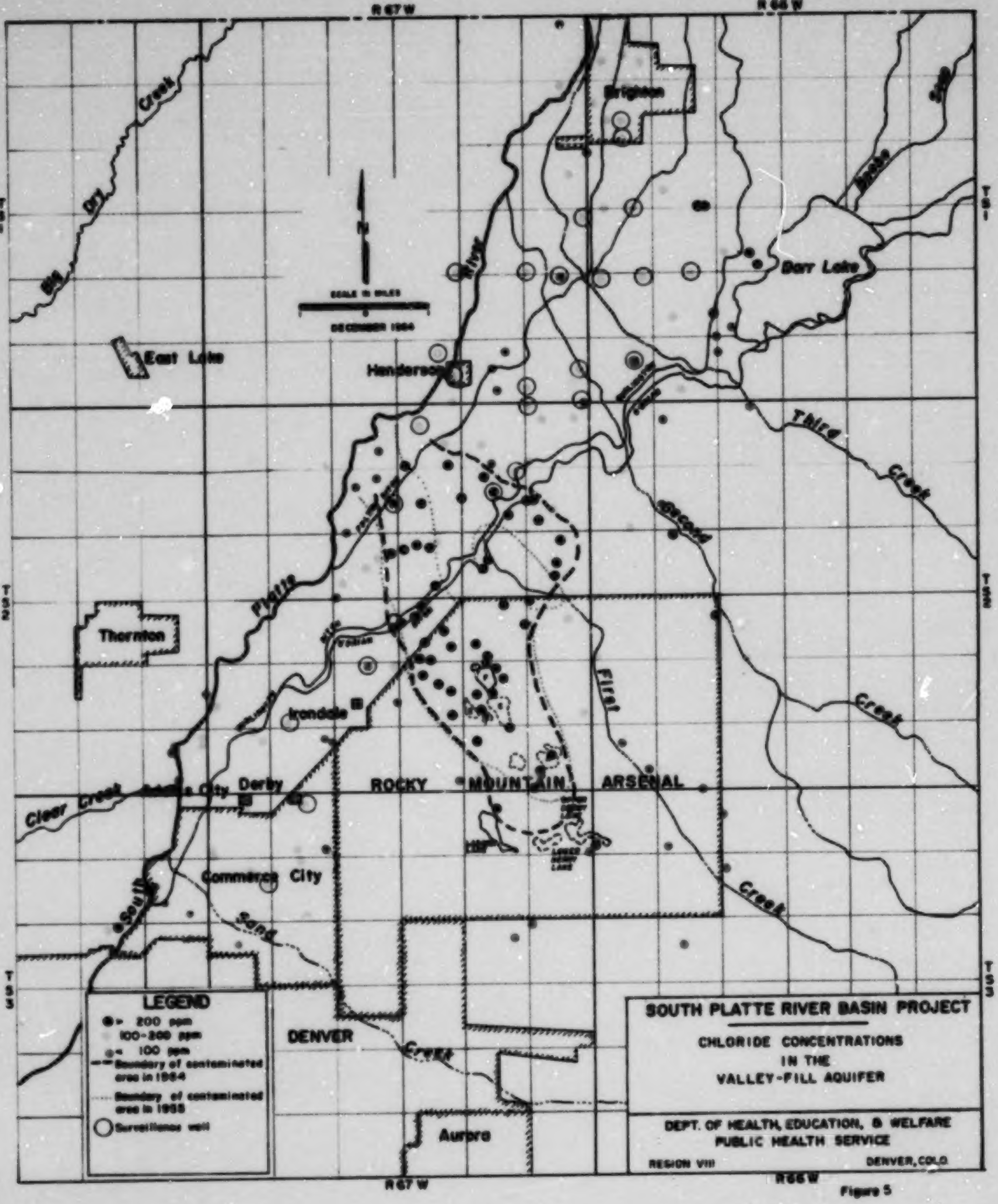

R 67 W
R 66 W
T S 1
T S 2
T S 3
Big Dry Creek
East Lake
Brighton
Henderson
Barr Lake
Third Creek
Second
Platte River
Thornton
Irondale
Derby
Clear Creek
Adams City
ROCKY MOUNTAIN ARSENAL
First Creek
Commerce City
South
Sand Creek
DENVER
Aurora
SCALE IN MILES
DECEMBER 1964
N
LEGEND
● > 200 ppm
100-200 ppm
● < 100 ppm
Boundary of contaminated area in 1964
Boundary of contaminated area in 1955
○ Surveillance well
SOUTH PLATTE RIVER BASIN PROJECT
CHLORIDE CONCENTRATIONS IN THE VALLEY-FILL AQUIFER
DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION VIII
DENVER, COLO.

Figure 5

field work will be performed between May 1965 and February 1966. This study will be coordinated with other activities of the Project because of the close relationship between surface water and ground water in the area. Because of the heavy concentration of feedlots in this area, detailed field studies will be conducted to determine the relationship between these operations and occurrence of nitrates in the valley-fill aquifer. Also, possible saline contamination from several producing oil fields in the area will be evaluated. Results of the study in the second study area are expected to be submitted in report form during March 1966.

8. Biological Studies

Biological investigations are employed in conjunction with stream surveys to provide a more complete picture of stream conditions, the degree of waste pollution present and the effect upon biological life present in the stream.

The Project has been without the services of a Staff Biologist since the first quarter of FY1964. However, the Technical Advisory and Investigations Section of SEC, Cincinnati, Ohio has provided significant time and services in conducting biological surveys, preparing reports, and offering consultative support in various aspects of this program. Without aid from SEC, this program would have ceased to exist. The Project is actively recruiting for another Biologist and it is expected that the position will be filled early in FY1966.

Follow-up biological studies were conducted in the area of sugar beet mill operations in August 1964. Investigations were made within the Denver Metropolitan area of the mainstem River, tributary streams and Barr Lake during May and August 1964. Reports have been submitted to the Project by SEC on these studies.

The Project will reinstate the biological program upon arrival of the replacement Biologist. The Basin-wide network of biological stations which was abandoned in the early part of FY1964 will be re-established and intensive work effort will be necessary in this area to bring the biological program back to its original schedule. It is expected that SEC will continue to provide reasonable support to this program when indicated.

9. Insect Vector Studies

The objectives of this activity are to determine the nature and extent of the significant disease vector problems within the South Platte River Basin and further, to evaluate the effects of water pollution on these same vector populations. This study was a joint effort between the Project and facilities of the Disease Ecology Section, Communicable Disease Center, USPHS, Greeley, Colorado.

This activity was essentially comprised of a review of published and unpublished reports and file documents available at CDC, a mosquito survey and field observations made within the Denver Metropolitan area by CDC and the Project, and lastly, a report based upon the above findings and other data acquired by the Project.

The historical review of all past vector studies by CDC and related health agencies within the Basin was undertaken by the Project during the last part of FY1964. A sampling program was conducted during the summer of 1964 in the Denver-Brighton area consisting of mosquito larvae collections at ten locations and adult mosquito collections at two locations. The first draft of the report on insect vector problems within the South Platte River Basin has been completed and at the present time is in the process of being reviewed for publication. There are no further studies planned by the Project in this area of investigation.

The most important conclusions provided by this study are given as follows:

a. Widespread mosquito problems exist throughout the Basin. There is large-scale breeding in many areas of those species of mosquitoes responsible for the transmission of encephalitis.

b. Certain areas of the Basin have rather serious rat infestation problems. One such location is the north part of Denver on the mainstem South Platte River and tributary streams. This rat population constitutes a possible plague threat to area citizens.

c. Significant vector populations of mosquitoes, rats and flies are present in the Basin and constitute a serious health hazard. These vectors are directly associated with and are sustained by high levels of organic pollution prevalent in Basin waters.

10. Stream Surveys

The objectives of this activity are: a) to determine actual waste concentrations and water quality conditions existing in flowing stream waters for a defined time period, generally during the low-flow season; b) to define and measure the effects of individual or combined wasteloads entering the stream over interim stretches; c) to correlate findings of the stream surveys with wasteloads, both organic and inorganic, measured by the other Project programs; d) to establish a base of present existing water quality for determination of future desirable stream water quality objectives.

Stream surveys were undertaken in the middle and lower Basin in conjunction with in-plant sugar beet surveys in December 1963 and January 1964. These surveys are further described under the sugar beet mill study activity.

During FY1965, major attention was directed towards the Denver Metropolitan area. In August 1964 a one-week sampling survey was undertaken on the mainstem South Platte River extending from Littleton, Colorado (above Denver) to a point about two miles below Denver. Samples were collected at 13 stations for chemical, physical, biochemical and bacteriological analyses. The data from this survey has received only preliminary analysis to date, part of which is shown on the following pages. Full evaluation and report of findings are expected to be completed by September 1965.

In September 1964 a one-week sampling survey was conducted on four major tributary streams entering the Denver Metropolitan area. Samples were collected at 12 stations above and within the Metropolitan area and analyzed for chemical, physical, biochemical and bacteriological values. The data received from this survey is being analyzed concurrently with that obtained from the August 1964 study of the mainstem river within Denver. Results derived from a preliminary evaluation of data are shown for the four tributary streams in the following pages.

Biological surveys were undertaken throughout the Denver Metropolitan area of the South Platte River and tributary streams to provide support to the stream water quality surveys in terms of pertinent findings on stream pollution. Major criteria included plankton enumeration, bottom animals, nuisance organisms, evidence of benthic deposits and overall visual observations. Staff Biologists from the Technical Advisory and Investigations Section, DWSPC, SEC, provided major support in this activity.

A sampling survey of three major irrigation canals located downstream of Denver was carried out during a one-week period in July 1964. This study comprised collection of samples at eight locations and laboratory analyses were made for chemical, physical, biochemical and bacteriological values. The data received from this study is being analyzed concurrently with that from the August and September 1964 surveys.

TABLE

AVERAGE WASTE CONCENTRATIONS AND LOADS--
SOUTH PLATTE RIVER FROM LITTLETON TO CHERRY CREEK
August 18 to 22, 1964

Station No.	Stream	Location	Diss. Oxygen	5-day BOD	COD	Tot. Susp. Sol.	Vol. Susp. Sol.	ABS	Conf. Coli Bact.	Fecal Coli Bact.
			Concentration - mg/l or MPN/100 ml(a)							
1222	SPR	Above Littleton	7.3	2	7	18	8	<0.1	595	130
1232	"	Near Hampden Ave.	7.5	3	12	50	10	---	255,000	150,000
1234	"	W. Florida Ave	6.9	4	18	39	10	0.8	305,000	130,000
1236	"	Bayaud Ave	6.9	3	16	37	10	---	150,000	49,000
1238	"	3rd Ave.	7.7	4	14	36	11	1.0	124,500	23,000
1240	"	Bel. 13th Ave	7.4	3	15	33	11	---	74,500	33,000
1242	Cherry Cr.	At mouth	9.0	3	27	15	8	---	13,500	3,400
			Load - Tons/day or BQU(b)							
1222	SPR	Ab. Littleton		1	2	5	2		0	0
1232	"	Nr. Hampden Ave		1	3	14	3		270	160
1234	"	W. Florida Ave.		1	5	12	3		340	140
1236	"	Bayaud Ave		1	5	11	3		170	60
1238	"	3rd Ave		1	4	11	3		140	30
1240	"	Bel. 13th Ave		1	4	11	4		90	40
1242	Cherry Cr.	At mouth		0	1	0	0		1	0

(a) Confirmed and fecal coli bacteria as median MPN/100 ml; all other variables as average mg/l.

(b) Confirmed and fecal coli bacteria as median BQU; all other variables as average tons/day.

River Mileages for Stations:

1222	324.8
1232	320.7
1234	318.0
1236	315.3
1238	314.6
1240	313.5
1242	312.3/0.1

TABLE

AVERAGE WASTE CONCENTRATIONS AND LOADS--
SOUTH PLATTE RIVER FROM CHERRY CREEK TO BELOW DENVER NORTHSIDE STP
August 18 to 22, 1964

Sta- tion No.	Stream	Location	Diss. Oxy- gen	5-day BOD	COD	Tot. Susp. Sol.	Vol. Susp. Sol.	ABS	Conf. Coli Bact.	Fecal Coli Bact.
			Concentration - mg/l or MPN/100 ml (a)							
1252	SPR	19th St.	8.2	5	21	28	11	0.7	104,500	47,000
1254	"	31st St.	10.9	6	22	33	[illegible]	---	49,000	34,500
1256	"	46th Ave	10.8	9	28	24	9	0.8	64,000	24,500
1258	"	STP Pipeline	10.1	10	25	28	15	---	79,000	23,000
1260	B-O'B Canal	York St.	1.5	87	150	100	58	---	8,950,000	2,750,000
1262	SPR	York St.	2.6	85	160	54	32	2.3	7,900,000	5,950,000
			Load - Tons/day or BQU(b)							
1252	SPR	19th St.		2	8	11	4		150	70
1254	"	31st St.		2	9	13	4		70	50
1256	"	46th Ave		4	12	10	4		100	40
1258	"	STP Pipeline		4	11	12	6		120	40
1260	B-O'B Canal	York St.		11	18	12	7		4,030	1,240
1262	SPR	York St.		54	102	34	20		18,640	14,040

(a) Confirmed and fecal coli bacteria as median MPN/100 ml; all other variables as average mg/l.

(b) Confirmed and fecal coli bacteria as median BQU; all other variables as average tons/day.

River Mileages for Stations:

1252	311.9
1254	310.8
1256	309.9
1258	309.1
1260	308.6/0.8
1262	307.9

TABLE

AVERAGE WASTE CONCENTRATIONS AND LOADS--
BEAR CREEK FROM EVERGREEN, COLO. TO STREAM MOUTH
September 21 to 26, 1964

Station No.	Stream	Location	Diss. Oxygen	5-day BOD	COD	Tot. Susp. Sol.	Vol. Susp. Sol.	ABS	Conf. Coli Bact.	Fecal Coli Bact.
			Concentration - mg/1 or MPN/100 ml(a)							
1230	Bear Cr.	0.1 mile ab. Evergreen Lake	8.9	1.4	10	8	6	<0.1	94	4
1228	" "	Ab. Morrison	8.7	2.1	15	12	5	--	330	25
1226	" "	Imm. above Kipling St.	9.7	1.8	--	8	5	--	410	154
1225	" "	At mouth	11.0	3.1	13	12	7	0.1	6,150	220
			Load - Tons/Day or BQU (b)							
1230	Bear Cr.	0.1 mile ab. Evergreen Lake		0	0	1	0		0	0
1228	" "	Ab. Morrison		0	1	1	0		0	0
1226	" "	Imm. above Kipling St.		0	--	0	0		0	0
1225	" "	At mouth		0	0	0	0		0	0

(a) Confirmed and fecal coli bacteria as median MPN/100 ml; all other variables as average mg/1.

(b) Confirmed and fecal coli bacteria as median BQU; all other variables as average tons/day.

River Mileages for Stations:

1230	320.9/21.7
1228	320.9/11.6
1226	320.9/5.7
1225	320.9/0.1

TABLE

AVERAGE WASTE CONCENTRATIONS AND WASTE LOADS-- CHERRY CREEK FROM GLENDALE, COLO. TO STREAM MOUTH

September 21 to 26, 1964

Station No.	Stream	Location	Diss. Oxygen	5-day BOD	COD	Tot. Susp. Sol.	Vol. Susp. Sol.	ABS	Conf. Coli. Bact.	Fecal Coli Bact.
			Concentration - mg/1 or MPN/100 ml(a)							
1244	Cherry Cr.	Between Colo. Blvd. & Steele St.	8.2	3	--	11	6	--	23,000	450
1242	Cherry Cr.	At mouth	8.7	6	21	5	4	0.4	31,000	2,930
			Load - Tons/day or BQU(b)							
1244	Cherry Cr.	Between Colo. Blvd. & Steele St.		0	--	0	0		0	0
1242	Cherry Cr.	At mouth		0	1	0	0		1	0

(a) Confirmed and fecal coli bacteria as median MPN/100 ml; all other variables as average mg/1.

(b) Confirmed and fecal coli bacteria as median BQU; all other variables as average tons/day.

River Mileages for Stations:

1244	312.3/4.0
1242	312.3/0.1

TABLE

AVERAGE WASTE CONCENTRATIONS AND LOADS-- SAND CREEK FROM DENVER EASTSIDE STP TO STREAM MOUTH

September 21 to 26, 1964

Station No.	Stream	Location	Diss. Oxygen	5-day BOD	COD	Tot. Susp. Sol.	Vol. Susp. Sol.	ABS	Conf. Coli Bact.	Fecal Coli Bact.
			Concentration - mg/l or MPN/100 ml(a)							
1264	Sand Cr.	Bel. Eastside STP;48th Ave	1.0	94	171	660	135	---	28,000,000	20,500,000
1263	Sand Cr.	Nr. mouth; Steele St. bel. B-O'B. Canal	2.7	83	139	515	106	1.6	10,750,000	2,700,000
			Load - Tons/day or BQU(b)							
1264	Sand Cr.	Bel. Eastside STP;48th Ave		3	6	15	4		2,250	2,820
1263	"	" Nr. mouth; Steele St. bel. B-O'B.Canal		6	7	28	6		510	800

(a) Confirmed and fecal coli bacteria as median MPN/100 ml; all other variables as average mg/l.

(b) Confirmed and fecal coli bacteria as median BQU; all other variables as average tons/day.

River Mileages for Stations:

1264 306.8/3.6
1263 306.8/0.2

TABLE

AVERAGE WASTE CONCENTRATIONS AND LOADS--
CLEAR CREEK FROM GOLDEN, COLO. TO STREAM MOUTH
September 21 to 26, 1964

Station No.	Stream	Location	Diss. Oxygen	5-day BOD	COD	Tot. Susp. Sol.	Vol. Susp. Sol.	ABS	Conf. Coli Bact.	Fecal Coli Bact.
		Concentration - mg/l or MPN/100 ml(a)								
1272	Clear Creek	0.5 miles above Golden	9.0	3	11	45	8	0.2	13,000	1,200
1270	" "	Kipling St.	1.8	95	--	--	--	--	9,450,000	3,950,000
1269	" "	Sheridan Blvd.	4.9	57	80	270	53	1.5	2,545,000	1,630,000
1267	" "	0.2 miles above mouth	8.0	10	61	--	--	0.6	254,000	101,500
		Load - Tons/Day or BQU (b)								
1272	Clear Creek	0.5 miles above Golden		0	2	8	1		7	0
1270	" "	Kipling St.		2	--	--	--		1,030	290
1269	" "	Sheridan Blvd.		4	5	17	3		410	90
1267	" "	0.2 miles above mouth		0	1	--	--		12	5

(a) Confirmed and fecal coli bacteria as median MPN/100 ml; all other variables as average mg/l.

(b) Confirmed and fecal coli bacteria as median BQU; all other variables as average tons/day.

River mileages for Stations:

1272	305.5/18.5
1270	305.5/10.2
1269	305.5/ 6.4
1267	305.5/ 0.2

Four locations on the South Platte River within the Denver Metropolitan area have been sampled on a weekly basis from December 1964-March 1965 to provide a picture in variation of BOD and dissolved oxygen through the Denver area over the winter season. This data will be tied into results of the July-September 1964 stream surveys.

The results of the various stream studies conducted during FY1965 within the Denver area will be integrated into one study plan and a report on composite findings is expected to be completed by September 1965. The data will be used to show water quality conditions on the mainstem River throughout the Denver area and extending downstream 40 miles to the confluence with St. Vrain Creek.

11. Sugar Beet Processing Wastes Evaluation

The purposes of these investigations are to a) determine by means of in-plant surveys and stream studies the present picture of sugar beet mill wasteloads discharged to Basin streams and the effects of these wastes on the water quality conditions of receiving streams; b) assist the industry insofar as possible, in suggesting better means of in-plant wastes control and treatment of wastes; develop in coordination with the Colorado State Department of Public Health a pollution abatement schedule for the beet sugar industry.

Two large-scale field surveys were carried out in December 1963 and January 1964 designed to provide detailed information on in-plant wastes at six mills and effects of these wastes on receiving streams. These surveys comprised a joint effort by the Project and facilities of the Technical Advisory and Field Investigations Section, DWSPC, SEC, Cincinnati, Ohio. Extensive biological studies were undertaken during the same time periods to provide support data on stream water quality. Samples were collected on a continuous basis for two weeks during December 1963 at 20 in-plant locations and ten stream stations; samples were collected for a two-week period in January 1964 at 20 in-plant locations and 15 stream stations.

During FY1965 the data from the field investigations described above was subjected to computer analysis by the SEC facilities. This analysis was completed in November 1964. The preparation of a report concerning the study of these six mills was undertaken jointly by the Project and SEC. This report which is expected to be completed by the end of FY1965 will contain suggested remedial measures and a tentative pollution schedule. In this connection, a meeting was held in February 1965 between the Colorado State Department of Public Health and the Colorado Inter-Agency Committee to establish guidelines for desired water quality objectives in Basin streams and the means to achieve these objectives. Considerable coordination and planning will develop between the Project and the Colorado State Department of Public Health over the period March-June 1965 to ensure completion of the tentative pollution abatement schedule.

A wastes survey for a seventh mill was carried out in January 1965 and the data collected from this study will be analyzed in the near future. The four remaining factories in the sugar beet processing wastes evaluation program will be studied in FY1966. The Johnstown, Colorado industrial operations which are a part of the sugar beet industry in the Basin are scheduled to be sampled in the early part of FY1966. The two remaining sugar beet factories will be studied during mid-FY1966. A recommended pollution abatement schedule for the entire sugar beet industry within the South Platte River Basin will be started near the end of FY1966.

12. Salinity Studies

No specific studies have been planned in the area of salinity investigations for FY1965. However, a small amount of data has been collected in the other program activities and some pertinent data analysis has been made in the Basic Data Analysis program from existing data of other agencies which provide limited insight into the salinity problems of the Basin. A short-term salinity program is being developed by the Project at the present time. The objectives of this program are to locate the source areas of salinity contribution and assess gross levels of salinity at key locations within the Basin. This program is expected to start around mid-FY1966 and continue on a limited basis for approximately one year.

13. Basic Data Analysis

A special program was established by the Project to collect existing streamflow and water quality data, and further, to analyze this data by statistical means. This activity, which was carried out during the second half of FY1964 and first half of FY1965, has the major objectives of a) determining the amount of basic data available in the above specified areas, and b) establishing a crude base-line concerning flow and water quality relationships necessary for adequate planning in other program activities of the Project.

The most important items that have been developed by this program include:

a. Seven and thirty-day low flow curves, minimum-monthly low flow curves and determination of particular months during which low flow occurs. This summary data was derived from selected periods of record for various key locations on the mainstem South Platte River and for two locations on tributary streams.

b. Salinity concentrations and flows averaged over various periods of record for selected mainstem River stations between Denver and Julesburg, Colorado to enable comparison of salinity levels between these key stations.

c. Salinity concentrations and loads for various River stations between Denver and Julesburg, Colorado were taken for selected periods of record to enable comparison of average values between key stations.

d. Determination of statistical significance of differences in mean values of salinity and nitrate concentrations between mainstem river stations from Denver to Julesburg, Colorado.

e. Dendritic charts for the mainstem South Platte River from Denver to Julesburg, Colorado illustrating for numerous points on the river, the base streamflow, tributary inflows, ground-water inflow, and significant diversions for irrigation. All factors are given in terms of acre feet per year. Two basic charts have been prepared, one showing the average year conditions, and the other showing conditions during a typical dry year. These charts are shown following the Basin map. This data analysis was developed from information provided by the U. S. Bureau of Reclamation, Denver, Colorado.

All aspects of the basic data analysis program as of January 1964 were integrated into the other activity programs, and additional data analysis will be performed only when needs of the individual programs indicate these analyses are necessary.

Significant Progress Towards Pollution Abatement

During the period of FY1965 up to the present, significant progress towards pollution abatement has been accomplished in the study area directly or indirectly as a result of Project activities. These advances can be measured for the most part in terms of positive actions. The following statments describe a number of areas in which the Project has stimulated pollution abatement.

1. Based upon results of the Project Municipal Waste Study recently completed in the Metropolitan Denver area, a pollution abatement schedule has been proposed to the Colorado State Department of Public Health. This agency has indicated basic agreement with these recommendations and the State officials are actively pursuing this problem.

2. A recommendation made to the Colorado State Department of Public Health which proposed that all sewage treatment plants conform to the criteria set forth in "Minimum Recommendations for Personnel, Laboratory Procedures and Records," as adopted by the Conference of State Sanitary Engineers in 1963, has been accepted by State officials.

3. The Colorado State Department of Public Health has implemented a closer surveillance of municipal waste treatment plants as a result of Project studies and findings. Reports of industrial plant inspections and data obtained from sampling industrial waste discharges to Basin streams by Project personnel have been furnished

to the Colorado State Department of Public Health. This agency has demonstrated its willingness to use this data to press for pollution abatement.

4. An industrial plant operated by the Packaging Corporation of America, which is presently a major source of industrial pollution to the River, is now committed to a definite time schedule for abatement. This action was a result of a joint effort by the Project and the Colorado State Department of Public Health.

5. Project activities have provided a greater degree of coordination and communication between Federal, State, County and District agencies engaged in water pollution abatement work in the study area.

6. The Colorado State Department of Public Health has written to the City and County of Denver recommending that immediate steps be taken to provide adequate treatment for industrial wastes now discharging to the River through municipal storm sewers. This action was based, in part, on sampling data provided to the State by the Project industrial waste studies.

7. A meeting was held in February 1965 between the Colorado State Department of Public Health and the Colorado State Agencies Committee on Water Pollution Control to establish guidelines for desired water quality objectives in the Basin streams and the means to achieve these objectives.

8. As a result of Project investigations of the sewage disposal facilities at the Federal Correctional Institution, Englewood, Colorado, recommendations were made to the Institution to abandon their present inadequate treatment plant and connect to a nearby sanitation district. Following a series of consultations between the Federal Correctional Institution and Project personnel, this proposal was forwarded by officials of the Institution to the Bureau of Prisons, Washington, D. C. for final approval. It is expected that a definite commitment will be forthcoming in the very near future.

9. The vegetable sampling program carried out by the Project in 1964 was made possible through the excellent cooperation received from the Tri-County Health Department and farmers within Adams County. Meetings were held in March and April 1964 with these interested groups to explain the objectives and needs of the Project in this study program. The various parties indicated that definite answers were needed concerning the bacteriological contamination of crops grown in the area. The awareness and response of these groups in seeking a definition of the problem and possible solutions, contributed in large measure to the detailed coverage and completeness of the vegetable study program.

10. The Colorado State Department of Public Health has recently issued a short report on waste disposal problems at beet sugar plants in Colorado. This report, stimulated by Project activity, recognizes the serious nature of sugar beet mill wastes and provides data on the

major processing wastes and general recommendations for waste abatement by the industry. Essentially, the Colorado State Department of Public Health has set the stage for awareness on the part of the State and the industry of the significant pollution problems existing and the action to be taken in the near future.

Data Storage and Retrieval Activities

A method for the storage and retrieval of water quality data was initiated by the Basic Data Branch of the U. S. Public Health Service in 1963. The objectives of this program, "The Storage and Retrieval of Data for Water Quality Control," are to provide: a) a single procedure for the identification of point locations pertinent to data collection, to include water quality sampling points, points of waste discharge or water intake, and other locations for which data are to be secured; b) a single coding system for the identification of specific parameters of interest in the water quality and control field. These two major concepts are being applied uniformly throughout the country by means of this system of river mileage index, regardless of the computer equipment or programming techniques utilized.

On May 31, 1963 the U. S. Public Health Service awarded a contract to the Colorado State University Research Foundation, Fort Collins, Colorado, to provide Stream Coding and Stream Mileage Measurements of the Colorado River Basin Drainage Network. On September 4, 1963 this contract was extended to cover the entire South Platte River Basin.

Mainstem and tributary mileages for the South Platte River Basin were derived, in large part, from the work done by Colorado State University. River mileages for communities and other significant points within the South Platte River Basin were developed by the Project. In locating and indexing various irrigation ditch systems, information from the Bureau of Reclamation, Region 7, Denver, Colorado was used, as well as topographic maps of the U. S. Geological Survey. A Project report was issued giving river mileages for the mainstem South Platte River, major tributary streams and all cities and towns within the Basin. These river mileages are used within all Project activities for identification purposes.

A Laboratory Data Reporting Form has been developed by the South Platte River Basin Project to standardize and expedite the transfer of laboratory data from the Project Laboratory to the Engineering Unit of the Project. A copy of this form is shown on the following page. The reporting form affords a reasonable procedure of classifying information by categories or types of samples, of facilitating analysis of results, and can be readily adapted to computer analysis.

SOUTH PLATTE RIVER BASIN PROJECT
USPHS, REGION VIII
Laboratory Data Report Form

Station Description:

River Mileage __ __ __.__ / __ __.__ / __ __.__ / __ __.__ / __ __.__ /

Key __ __ __ __ / __ / __ __ / __ / __ __ __ __ __ __ / __ __ __ __ **Ref.** __ __ __ __
number / loc. / seq. / type / date / time (r. -freq. -C) / __ __ __ __ series

CHEMICAL & PHYSICAL

Temp. (°C)	__ __.__	Susp. Sol. (mg/l)	__ __ __ __.
D. O. (mg/l)	__ __.__	Vol. Susp. Sol. (mg/l)	__ __ __ __.
pH	__ __.__	Setl. Sol. (ml/l)	__ __ __.__
Tot. Alk (as $CaCO_3$) (mg/l)	__ __ __ __.	NO_3-N (mg/l)	__ __.__ __
BOD (mg/l)	__ __ __ __.__	NH_3-N (mg/l)	__ __.__ __
COD (mg/l)	__ __ __ __.__	ABS (mg/l)	__ __.__
Cond. (µmhos/cm)	__ __ __ __ __.	____________	__ __ __ __
Hard. (as $CaCO_3$) (mg/l)	__ __ __.__	____________	__ __ __ __
Chlorides (mg/l)	__ __ __ __.__	____________	__ __ __ __
Color	__ __ __	____________	__ __ __ __
Turbidity	__ __ __ __ __	____________	__ __ __ __ __
TDS (mg/l)	__ __ __ __.	____________	__ __ __ __ __

BACTERIOLOGICAL

	Waters	Vegetables	Soils
Tot. Coli (MPN/100 ml. or /g.)	__ __.__ E __	__ __.__ E __	__ __.__ E __
Fec. Coli " " "	__ __.__ E __	__ __.__ E __	__ __.__ E __
Fec. Strep " " "	__ __.__ E __	__ __.__ E __	__ __.__ E __
____________ " "	__ __ __ __ __	__ __ __ __ __	__ __ __ __ __

REMARKS

Bibliography

The following reports outlined in the chart below have been released or are scheduled for release in FY1965.

Status to Date		Report	Number
Approved for Release (April 15, 1965)	1.	River Mile Index South Platte River Basin	PR- 1
In Headquarters Review	1.	Municipal Wastes Report Metropolitan Denver Area	PR- 2
	2.	Significant Vector Problems in the South Platte River Basin	PR- 3
	3.	Report on Ground-Water Pollution in the South Platte River Valley Between Denver and Brighton, Colorado	PR- 4
In Preparation	1.	Bacteriological Study of Vegetables Irrigated with Sewage Polluted Water	PR- 5
	2.	Project Report for the Second Session of the Conference in the matter of Pollution in the South Platte River Basin	

Departure from 1965 Plans

A number of activities scheduled during FY1965 have been changed and the PERT diagram has been revised accordingly. This departure from earlier plans was necessitated principally because of the enlargment of certain activities and a major delay of nearly five months in the revision and expansion of the Chemistry Section of the Project Laboratory. Additional factors included a vacancy created by the loss of the Project Biologist in mid-August 1964 which is not expected to be filled until FY1966; delivery delays concerning laboratory and sampling equipment; and earlier problems in recruiting personnel as well as the current freeze on positions initiated December 31, 1964. Future planning has been developed to make greater allowances for these problems in FY1966 and FY1967.

The studies which have been rescheduled, together with the factors which required readjustment are shown below:

1. Industrial Wastes Evaluation

The sampling portion of this program was extended from November 1964 to February 1965. This change was necessitated by a lack of sampling equipment in the early summer, the limited facilities for analysis at the Project Laboratory, the expansion of this program to include sampling of storm sewer outfalls and the difficulties encountered in obtaining composite samples and gaging during the colder weather. Preparation of an internal report and a recommended pollution abatement schedule was initiated in March 1965 for the Denver Metropolitan area. The planning and field work for the 2nd and 3rd Project study areas will commence in May 1965.

2. Municipal Waste Evaluation

On the basis of the findings for the Denver Metro area, it was decided to expand the internal report to a published report including a recommended pollution abatement schedule. This report scheduled to be completed in December 1964 was not completed until March 1965. Consequently, field studies in the remainder of the Basin are scheduled to begin in May rather than February 1965.

3. Municipal Water Supply Evaluation

On the basis of a recommendation from Mr. H. F. Clark, Bacteriological Consultant, an intensive bacteriological sampling program conducted from September through December 1964 was added into this program. A final report for this area of study has not been undertaken at this time; however, the results will be incorporated in the final Project report.

4. Barr Lake Study

This study was extended from March 1965 into August 1965 primarily due to the fact that Professor Robert O. Sylvester, a Project Consultant, recommended a year of record for sampling data. He has furnished an interim report for the Conference and will submit a final report by the end of FY1965.

5. Vegetable Sampling Program

On the basis of findings obtained in the Denver area and the recommendations of Mr. H. F. Clark, Bacteriological Consultant, it has been decided to eliminate additional studies in the remainder of the Basin. A draft report for this study is planned for June 1965.

6. Ground-Water Studies

The ground-water study for the first Project study was originally scheduled to be completed in January 1965. Significant data findings indicated that a published report was necessary for the North Denver area. This draft report was submitted for review in March 1965. An internal report for the entire first study area will now be completed in April 1965. Field studies will be initiated for the second Project study area in May 1965.

7. Biological Studies

The loss of the Project Biologist during the first quarter of FY1965 resulted in suspension of this Project activity. Through generous assistance of the TA&I Section, Technical Services Branch, SEC, the field investigations in the Denver area are essentially complete and Mr. Keup has recently submitted to the Project a preliminary report of findings. Significant departure from 1965 plans has been in the area of the Basin-wide network biological sampling program. This network has not been maintained since early in FY1965. A replacement Biologist is necessary for the re-establishment of this activity and for continuing the biological support needed in many Program activities.

8. Sugar Beet Mill Investigations

This program has been altered to allow for the draft report of six mills studied in the winter of 1963-64 to be made available by the end of June 1965, rather than in November 1964. The original schedule called for the data computer at SEC to complete processing of the sampling information by early July 1964. A lack of priority for this work at SEC resulted in a delay of approximately five months. It is now planned that the industrial waste portion of this report will be finished in April 1965 and a completed draft report by end of June 1965.

9. Basic Data Analysis

This program was phased out as a separate activity in January 1965. The major portion of this work has been completed and the remainder will be integrated with other Project activities.

In conclusion, it should be mentioned that the Headquarters Project staff is scheduled to move to new quarters early in May 1965. This action may cause some revisions in deadlines scheduled during that time.

PLANS AND SCHEDULES - FY1966

During FY1966, the South Platte River Basin Project will be carrying forth investigations essentially in ten program areas. Certain programs will be completed early in FY1966, one new program will be initated during this year, and other programs undertaken during FY1965 will be continued in FY1966. The Project activities scheduled for FY1966, as outlined in the Project PERT diagram, are described below:

1. Industrial Wastes

Interviews and waste effluent sampling of all important industrial plants within the second and third Project study areas will be undertaken during FY1966. All necessary reports for industrial waste evaluation activities carried out in FY1965 and FY1966 will be completed before the end of FY1966. A tentative pollution abatement schedule will be developed for industrial plants in the second and third study areas by the end of FY1966. In addition to industrial plants, limited studies will be initiated for mining wastes at the end of FY1966 and this work will continue into FY1967.

2. Municipal Wastes

Sampling and evaluation of all important municipal waste discharges within the Basin outside of the Denver Metropolitan area will continue through the first-half of FY1966. All necessary reports for this activity will be completed by the end of FY1966. A tentative pollution abatement schedule will be developed for these municipal waste discharges by the end of FY1966.

3. Municipal Water Supply Evaluation

During the first half of FY1966, a limited evaluation will be made for selected municipal water supplies in the second Project study area. This work will essentially consist of an examination of sources of supply, treatment facilities and system operation. A series of samples will be collected for chemical analysis. In the remainder of FY1966 field work in the second study area will be completed and a limited evaluation will be initiated for the third Project study area. These latter studies will continue into FY1967.

4. Barr Lake Study

The final draft report on findings of the Barr Lake Study will be completed during the first half of FY1966. This report will be based in large part upon a detailed study and evaluation of data made by Professor R. O. Sylvester, University of Washington, who is serving as a Consultant to the Project in the Barr Lake problem. This report will conclude the Project activities on the Barr Lake problem unless follow-up studies are indicated in late FY1967 after completion of major sewage treatment works for Metropolitan Denver.

5. Feedlot Wastes Evaluation

Feedlot operations will be monitored throughout FY1966 to determine the pattern of waste drainage from these waste sources, particularly during times of runoff and snowmelt. Typical hydrological conditions will permit completion of the field studies portion of this program near the end of FY1966. The draft report in this program will be started near the end of FY1966.

6. Ground-Water Studies

Collection of background information, interviews, and collection and analysis of samples from selected wells for the second Project study area will be undertaken throughout most of the period of FY1966 to determine the nature and extent of ground-water pollution throughout this area. Particular emphasis will be directed to public water supply and individual household uses which rely on ground-water sources. An internal report on pertinent findings from this program will be made available near the end of FY1966.

7. Biological Studies

The Basin-wide network of biological sampling stations will be re-established in the first half of FY1966. Additionally, biological studies will provide support to the stream surveys, sugar beet waste, and municipal and industrial waste evaluation programs during FY1966.

8. Stream Surveys

The report on complete findings of stream surveys undertaken in FY1965 within the Denver Metropolitan area is expected to be made available by August of 1965. This document will provide a picture of stream water quality conditions and gross pollution projected from Denver 40 miles downstream on the mainstem River to the confluence with St. Vrain Creek.

Short-term stream sampling surveys will be undertaken for major tributary streams and the mainstem River within the second Project study area in the first half of FY1966 to determine water quality conditions during the summer period. Evaluation of this data will be carried out in the second half of FY1966. These stream studies and the results obtained will be correlated in full respect with the objectives and findings of all related Project activities.

9. Sugar Beet Processing Wastes Evaluation

There are two sugar beet by-product recovery plants located at Johnstown, Colorado which are an integral part of the beet sugar industry within the Basin. The waste discharges from these two factories together with stream sampling above and below the plants, will be undertaken in the first part of FY1966. Waste studies will also be carried out in the winter of 1965-1966 for two remaining sugar beet processing mills not covered by previous Project investigations. This will conclude the field studies on sugar beet mill wastes in the Basin unless special needs indicate otherwise. Reports will be prepared in the latter part of FY1966 for field studies conducted within FY1966. The proposed pollution abatement schedule for the sugar beet industry within the Basin will be developed in part at the end of FY1966 and completed in early FY1967.

10. Salinity Studies

A salinity evaluation program is planned to be initiated by the Project in the second quarter of FY1966. This program will consist of a minimum work effort for purposes of satisfying limited, but nevertheless, important objectives. The objectives are to locate the source areas of salinity contribution and assess gross levels of salinity at key locations within the Basin. The program will include a 12 month continuous sampling activity to start in October 1965 and continue through September 1966. Approximately 13 stations are planned for this study. Samples will be collected once a month for complete inorganic analysis and once a month for limited inorganic analysis. The Project plans to make arrangements with the USGS for the latter agency to provide chemical analysis on samples and limited flow measurements at locations for which data is required. An evaluation report on this activity will be prepared in FY1967.

Economic Studies

An economic study is proposed by the Project as essential to achieving certain goals and objectives previously described at the First Session of the Conference in the matter of Pollution of the South Platte River Basin. The study will be limited to one economist consultant employed by the Project for a period of not more than six months. This program is planned to start in the first half of FY1966. The immediate objectives of the economic study are to identify and measure the dominant factors in the region affecting water use and describe the relationships between these factors. The overall objectives of the economic study are to permit a more explicit definition of major waste treatment problems and water needs to be encountered for the immediate future, and, most important, to establish a base for intelligent thinking on water quality objectives for Basin streams.

The Project has been given the task in conjunction with the Colorado State Department of Public Health of formulating water quality objectives and determining the means to achieve these desired objectives. To date, joint discussion has been centered on effluent standards and their adaptability to all conditions of stream pollution within the Basin. The Colorado State Department of Public Health has repeatedly stated that pollution abatement is subject to economic feasibility and implied that the benefits of waste treatment and control must exceed the costs required. The

State's comments on economic feasibility have referred to the future application of both effluent and stream classification objectives or standards. The economic study proposed would therefore provide a more realistic basis for determining the water quality desired and specific pollution abatement needs. Growth needs of the immediate future in terms of additional water supply and waste treatment will be defined in more detail and automatically become part of the economic study product.

Economic trends are of particular interest in the South Platte River Basin because of the rapid growth of population that has taken place and will most likely continue in portions of the Basin and because of the probability of a large scale change in productive activity from agriculture to urban industry.

The South Platte River Basin could, in fact, become a laboratory for observing the competition between conflicting water uses and the problems involved in the transfer of water rights from one use to another. The problems may be more acute here because the middle Basin area is one of the most productive agricultural regions in the nation. Yet portions of this same area have excellent resources to support a science-industry complex and the associated urban and recreational demands. The developing competition for water, thus, will be between two or more strong, well endowed and productive users.

The study proposed would be in the nature of a reconnaissance or survey and a statistical and subjective evaluation of the existing economic base. In large part, secondary sources of data would be utilized, drawing upon Federal, State and local government agencies as well as the universities, private research and business organizations of the area.

A Basin-wide study would integrate well with work being undertaken by the Water Resources Section, Region VIII, under provisions of Public Law 660, Section 2b. Reports now in progress or scheduled in the near future for the Bureau of Reclamation include: 1. Cache la Poudre; 2. Narrows, and 3. Upper South Platte projects, all of which are within the South Platte River Basin. These investigations would fit into and in turn be enriched by a Basin-wide economic study.

Narrative Justification - FY1965, FY1966, and FY1967

A. Summary of Activities - FY1965

The majority of field work during FY1965 has been directed towards major water pollution problems within the Denver Metropolitan area. By the end of FY1965, field investigations will be essentially completed in this area for municipal and industrial wastes, the Barr Lake problem, bacteriological study of vegetables irrigated with sewage-laden waters, and stream water quality studies. Tentative pollution abatement schedules on municipal and industrial wastes in the Denver Metropolitan area will be completed and presented to the Colorado State Department of Public Health. Reports will be issued in published form on municipal wastes in the Denver area and ground-water pollution in the Denver-Brighton area. Other reports on the Denver area will be near completion. The Basin-wide study on insect vector problems has been completed and a published report on this activity will be released. A waste evaluation of six sugar beet mills will be completed together with a tentative pollution abatement schedule for this industry.

B. Summary of Activities - FY1966

Primary emphasis in FY1966 will be directed to major water pollution problems in the second Project study area, which comprises the Basin downstream of Denver to and including the cities of Fort Collins and Greeley. In addition, many Project programs will expand beyond the second study area into the remainder of the Basin. Ground-water pollution studies and stream water quality surveys in FY1966 will be undertaken exclusively in the second study area. Municipal and industrial wastes surveys will cover the entire Basin area outside of Metropolitan Denver and these two programs, except for mining wastes evaluation, will be completed. The remainder of sugar beet mills in the Basin will be studied during FY1966 and the beet sugar industry evaluation will be completed except for the development of the suggested pollution abatement schedule. A continuous monitoring sampling program on wastes from selected feedlot operations in the Basin will be conducted throughout the year. A limited salinity evaluation program involving collection of samples at a selected number of stream stations will be undertaken. The latter program is planned to be conducted in joint cooperation with the U. S. Geological Survey. Either published reports or interim reports will be issued for each program activity, depending upon Project requirements.

C. Summary of Activities - FY1967

Project activities in FY1967 will be primarily directed to outstanding water pollution problems in the lower Basin and in the headwaters region above Denver. In addition, a major effort will be devoted to the drafting of the Final Project Report and final pollution abatement schedule. The Final Project Report will be completed during the first part of FY1968. During FY1967 an evaluation of mining wastes will be completed and ground-water studies and stream surveys will be completed for the Basin areas described above. Also, the feedlot waste and salinity evaluation programs will be completed. All individual program activities will be completed at the end of FY1967 and separate reports may be issued for the various activities, depending upon Project requirements. The major factor determining Project progress during this year will be the rate at which the various elements of the Final Project Report and final pollution abatement schedule can be assembled and integrated. At the end of FY1967 the Final Report and commensurate waste abatement schedules will be approximately 70 percent completed.

D. Analysis of Project Completion

End of FY1965	% Completion
Engineering Field Studies	40
Analysis of Data and Report Preparation [a]	35
Laboratory Work	40

End of FY1966	% Completion
Engineering Field Studies	75
Analysis of Data and Report Preparation [a]	70
Laboratory Work	75

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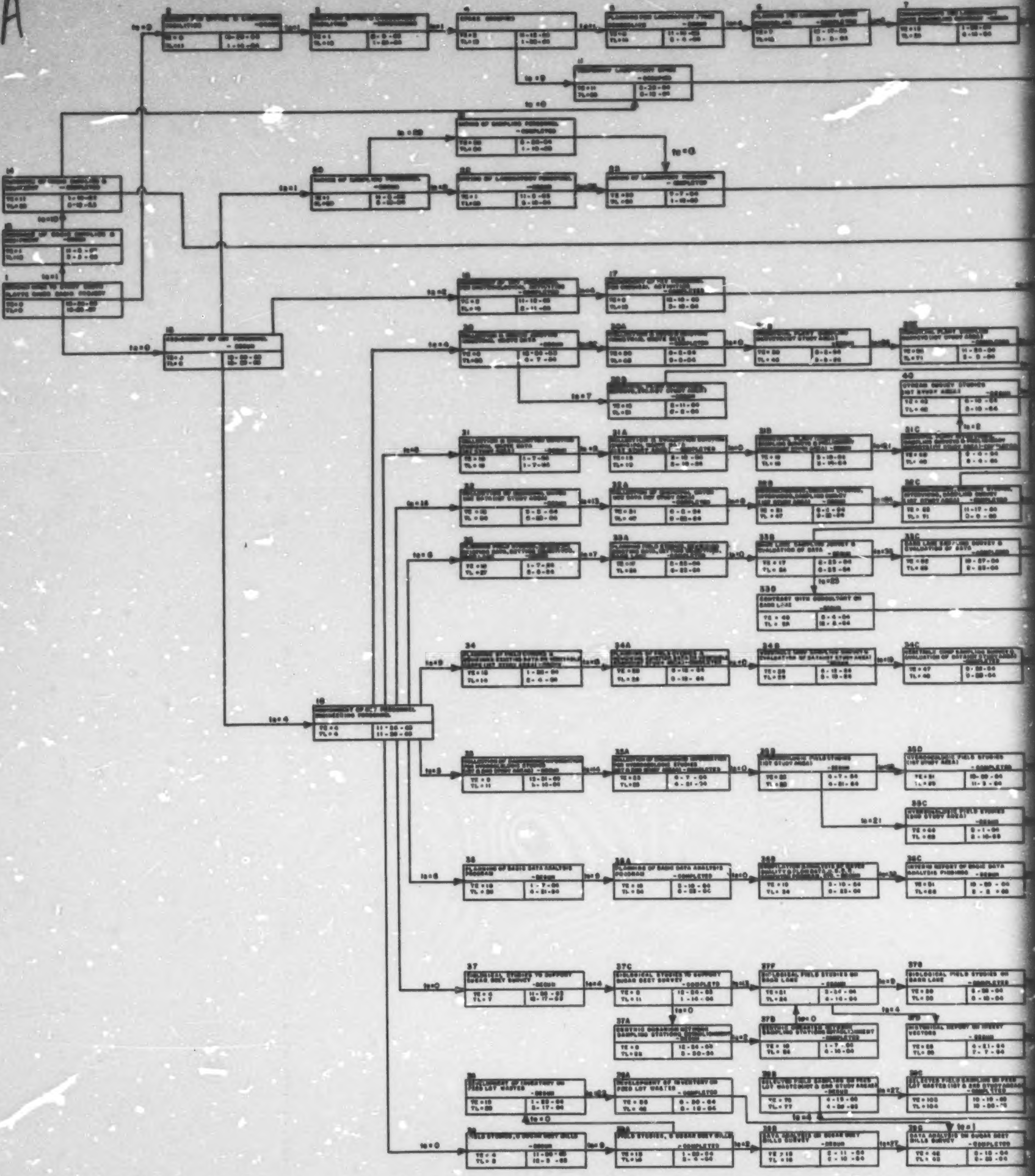
[a] Excluding Final Project Report

End of FY1967	**% Completion**
Engineering Field Studies	100
Analysis of Data and Report Preparation	100
Laboratory Work	100
Final Project Report	70

a/ Excluding Final Project Report

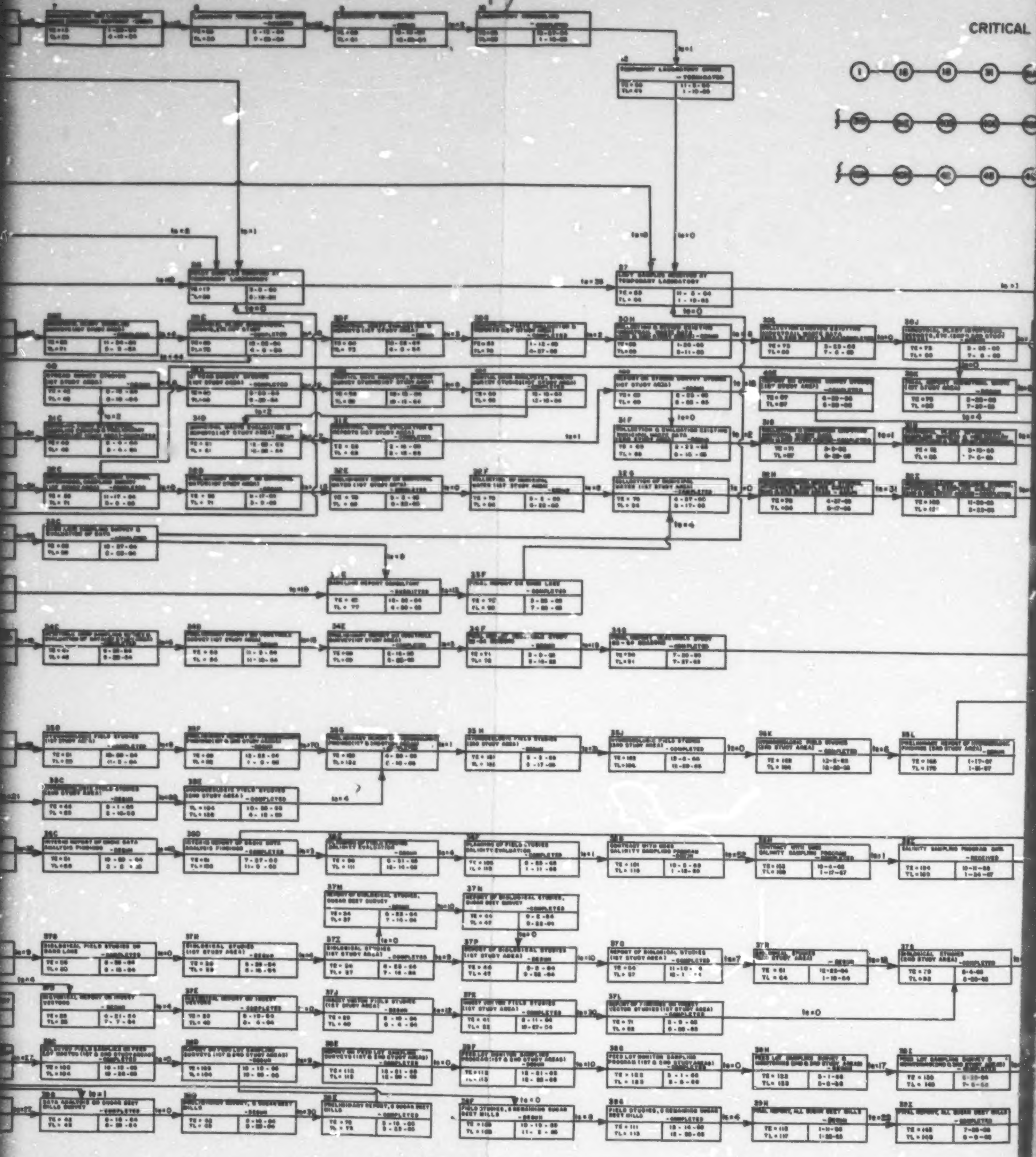
II. ORGANIZATION AND MANAGEMENT

A


37
BIOLOGICAL STUDIES TO SUPPORT SUGAR BEET SURVEY -BEGUN
37C
BIOLOGICAL STUDIES TO SUPPORT SUGAR BEET SURVEY -COMPLETED
37F
BIOLOGICAL FIELD STUDIES ON BARR LAKE -BEGUN
37G
BIOLOGICAL FIELD STUDIES ON BARR LAKE -COMPLETED
37A
37B
HISTORICAL REPORT ON INSECT VECTORS -BEGUN
DEVELOPMENT OF INVENTORY ON FEED LOT WASTES -BEGUN
DEVELOPMENT OF INVENTORY ON FEED LOT WASTES -COMPLETED
DATA ANALYSIS ON SUGAR BEET MILLS SURVEY -BEGUN
DATA ANALYSIS ON SUGAR BEET MILLS SURVEY -COMPLETED

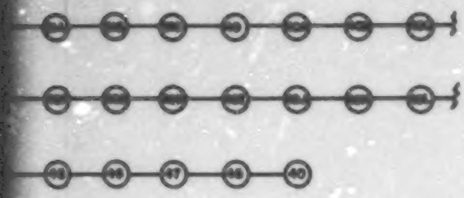
65-b

B


CRITICAL
TEMPORARY LABORATORY
DATA ANALYSIS ON SUGAR BEET MILLS SURVEY - COMPLETED
BIOLOGICAL FIELD STUDIES ON SAND LAKE - COMPLETED
BIOLOGICAL STUDIES (1ST STUDY AREA) - BEGUN
BIOLOGICAL STUDIES (1ST STUDY AREA) - COMPLETED
REPORT OF BIOLOGICAL STUDIES, SUGAR BEET SURVEY - BEGUN
CONTRACT WITH USGS SALINITY SAMPLING PROGRAM - BEGUN
SALINITY SAMPLING PROGRAM DATA - RECEIVED
TE = 104
TL = 160
10-11-66
1-24-67

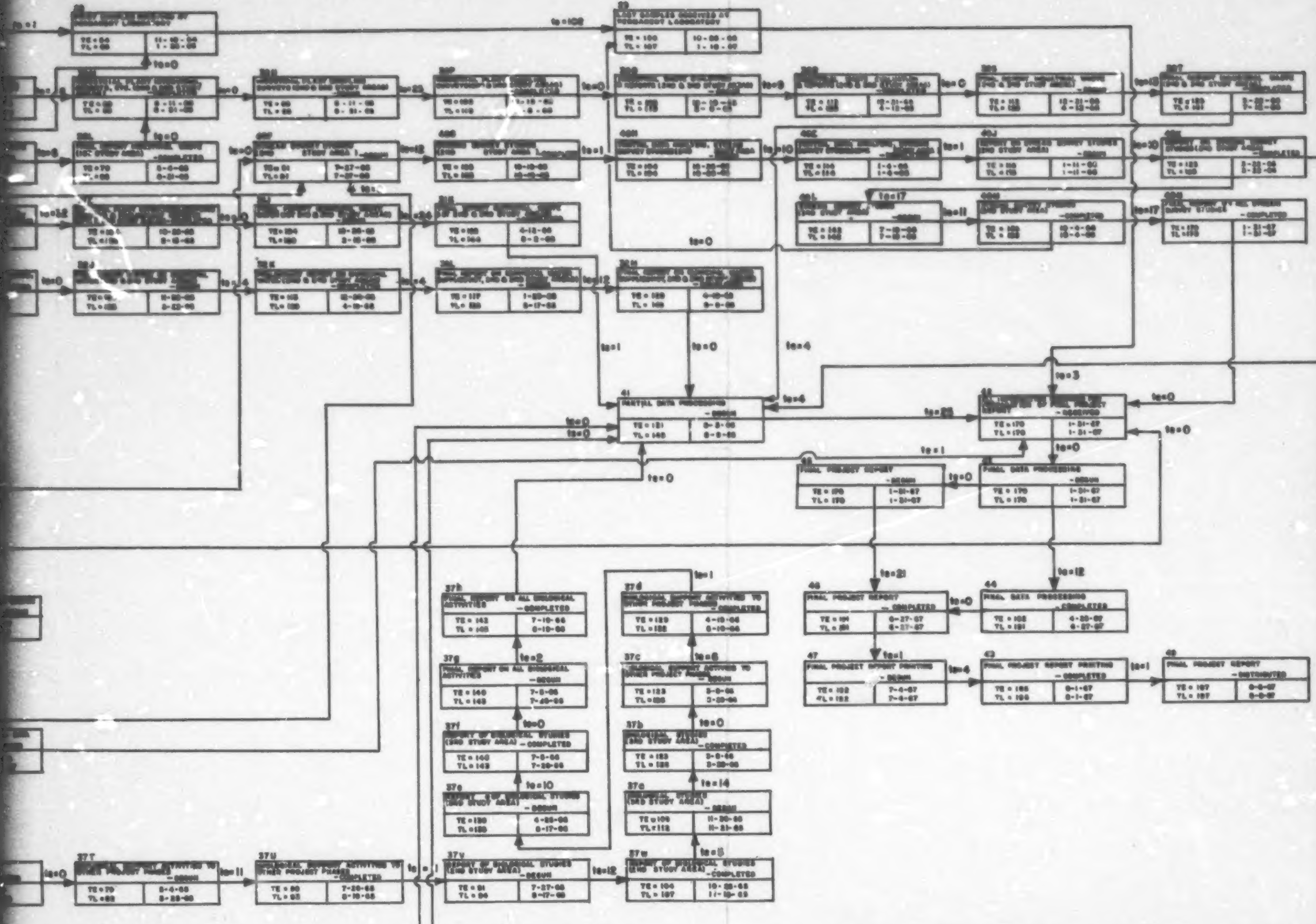
C

CAL PATH • 197 WEEKS



LEGEND

te — Expected duration in weeks
TE — Earliest date an event may be started
TL — Latest date an event may be started
Slack — TL - TE



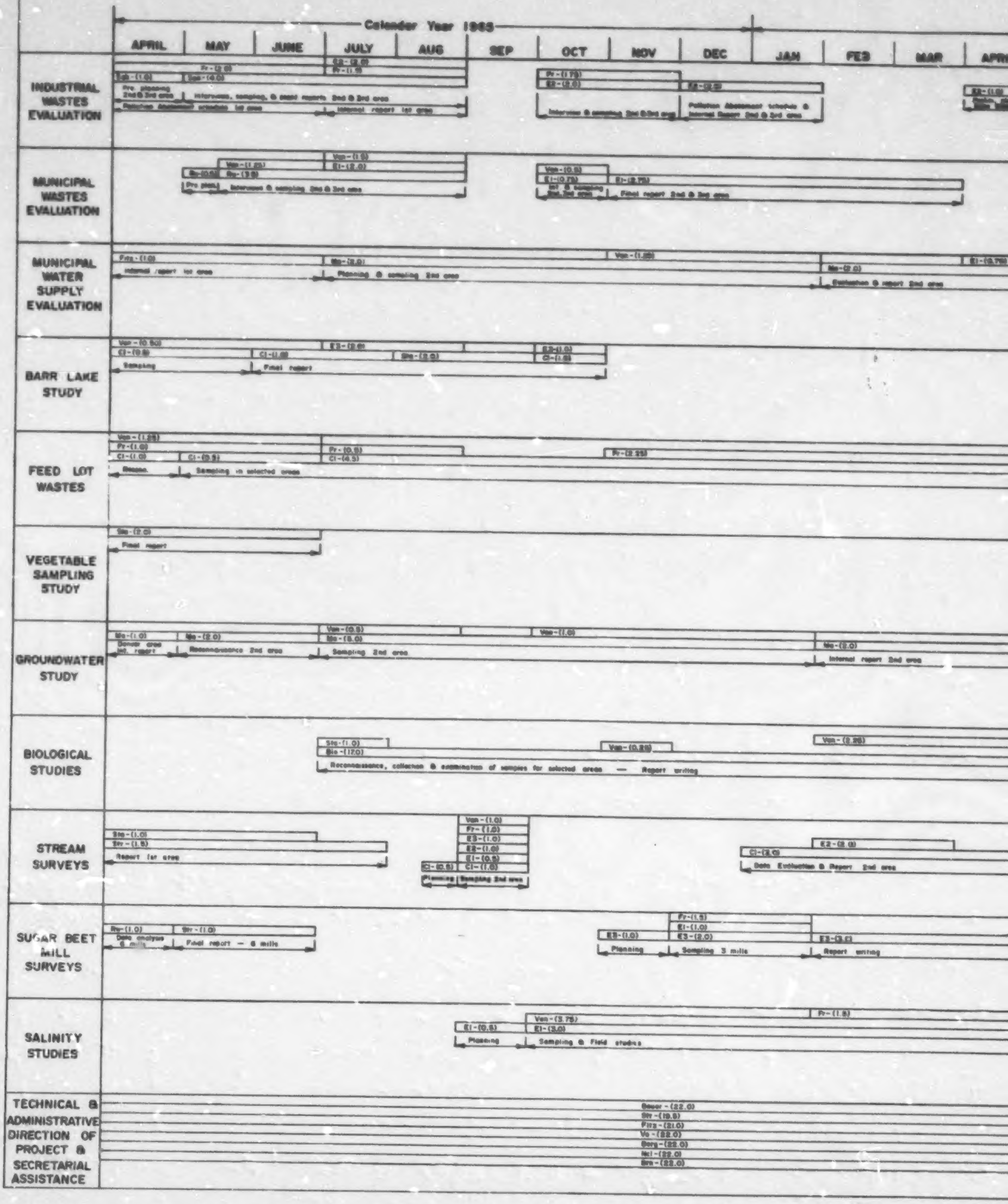
te=102
te=0
te=3
te=25
te=1
te=0
te=21
te=12
PARTIAL DATA PROCESSING
FINAL PROJECT REPORT
FINAL DATA PROCESSING

PROGRAM EVALUATION & REVIEW TECHNIQUE

SOUTH PLATTE RIVER BASIN PROJECT

U. S. Dept. of Health, Education, and Welfare
Public Health Service
Water Supply and Pollution Control
Region VIII
Revised 3/8/65

A

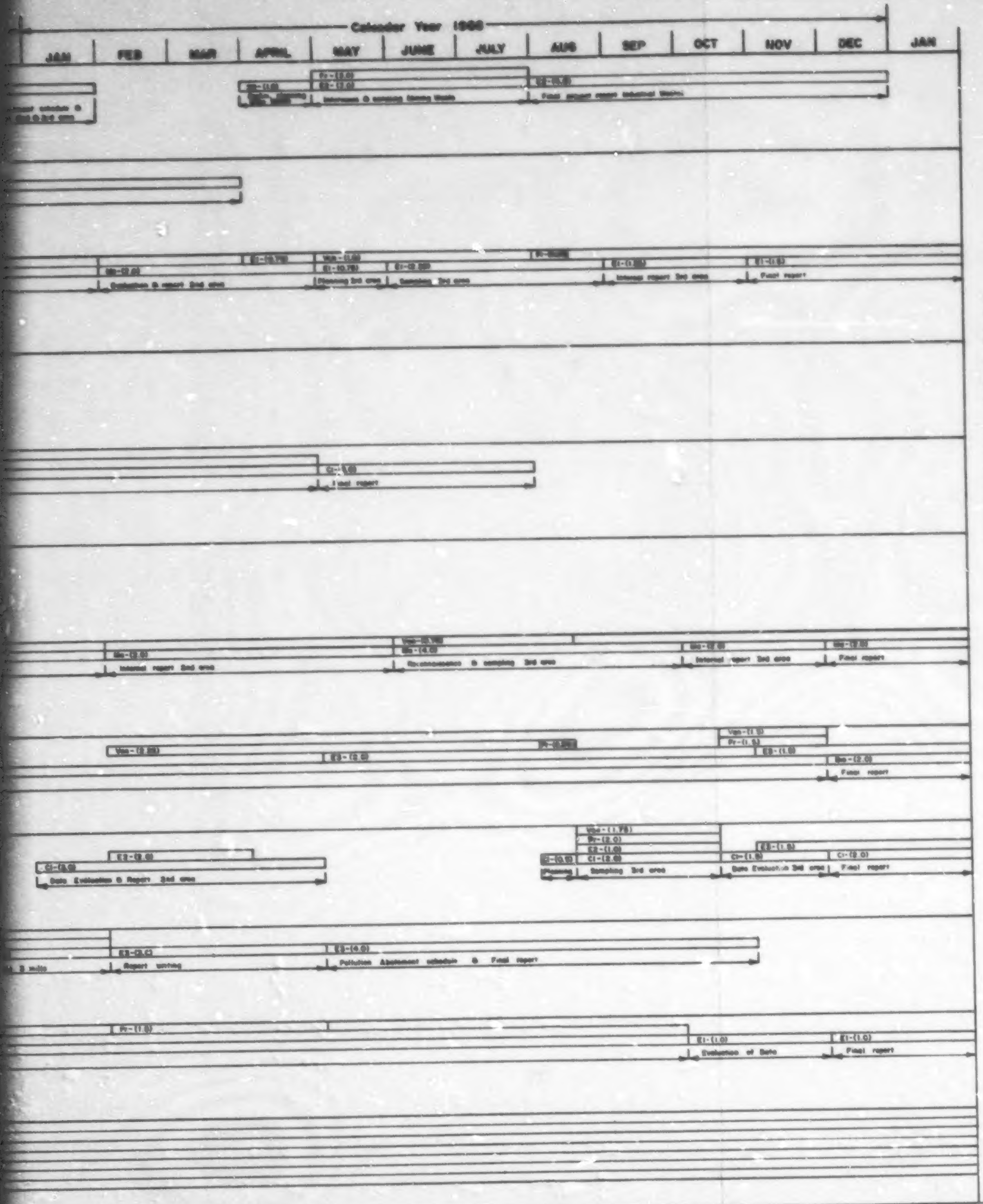

Calendar Year 1965
APRIL
MAY
JUNE
JULY
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APRI
INDUSTRIAL WASTES EVALUATION
E2-(2.0)
Fr-(2.0)
Fr-(1.5)
Sch-(1.0)
Sm-(4.0)
Pre. planning 2nd & 3rd area
Interviews, sampling, & plant reports 2nd & 3rd area
Pollution Abatement schedule 1st area
Internal report 1st area
Fr-(1.75)
E2-(2.0)
E2-(2.0)
Interview & sampling 2nd & 3rd area
Pollution Abatement schedule & Internal Report 2nd & 3rd area
E2-(1.0)
MUNICIPAL WASTES EVALUATION
Van-(1.5)
Van-(1.25)
E1-(2.0)
Ru-(0.5)
Ru-(3.5)
Pre plan.
Interviews & sampling 2nd & 3rd area
Van-(0.5)
E1-(0.75)
Int. & sampling 2nd, 3rd area
E1-(2.75)
Final report 2nd & 3rd area
MUNICIPAL WATER SUPPLY EVALUATION
Fitz-(1.0)
Internal report 1st area
Mo-(2.0)
Planning & sampling 2nd area
Van-(1.25)
Mo-(2.0)
Evaluation & report 2nd area
E1-(0.75)
BARR LAKE STUDY
Van-(0.50)
Cl-(0.5)
Sampling
Cl-(1.0)
Final report
E3-(2.0)
Sts-(2.0)
E3-(1.0)
Cl-(1.0)
FEED LOT WASTES
Van-(1.25)
Fr-(1.0)
Cl-(1.0)
Cl-(0.5)
Recon.
Sampling in selected areas
Fr-(0.5)
Cl-(4.5)
Fr-(2.25)
VEGETABLE SAMPLING STUDY
Sts-(2.0)
Final report
GROUNDWATER STUDY
Mo-(1.0)
Denver area int. report
Mo-(2.0)
Reconnaissance 2nd area
Van-(0.5)
Mo-(5.0)
Sampling 2nd area
Van-(1.0)
Mo-(2.0)
Internal report 2nd area
BIOLOGICAL STUDIES
Sts-(1.0)
Bio-(17.0)
Reconnaissance, collection & examination of samples for selected areas — Report writing
Van-(0.25)
Van-(2.25)
STREAM SURVEYS
Sts-(1.0)
Str-(1.5)
Report 1st area
Van-(1.0)
Fr-(1.0)
E3-(1.0)
E2-(1.0)
E1-(0.5)
Cl-(0.5)
Cl-(1.0)
Planning
Sampling 2nd area
E2-(2.0)
Cl-(2.0)
Data Evaluation & Report 2nd area
SUGAR BEET MILL SURVEYS
Ru-(1.0)
Data analysis 6 mills
Str-(1.0)
Final report — 6 mills
E3-(1.0)
Planning
Fr-(1.5)
E1-(1.0)
E3-(2.0)
Sampling 3 mills
E3-(3.0)
Report writing
SALINITY STUDIES
E1-(0.5)
Planning
Van-(3.75)
E1-(3.0)
Sampling & Field studies
Fr-(1.5)
TECHNICAL & ADMINISTRATIVE DIRECTION OF PROJECT & SECRETARIAL ASSISTANCE
Bauer-(22.0)
Str-(19.5)
Fitz-(21.0)
Vo-(22.0)
Berg-(22.0)
Ncl-(22.0)
Bre-(22.0)

65-e

B

TIME—MANPOWER UTILIZATION PLAN

South Platte River Basin Project
U. S. Dept. of Health, Education & Welfare
Public Health Service
Water Supply & Pollution Control
Region VIII
Revised 3/1/65

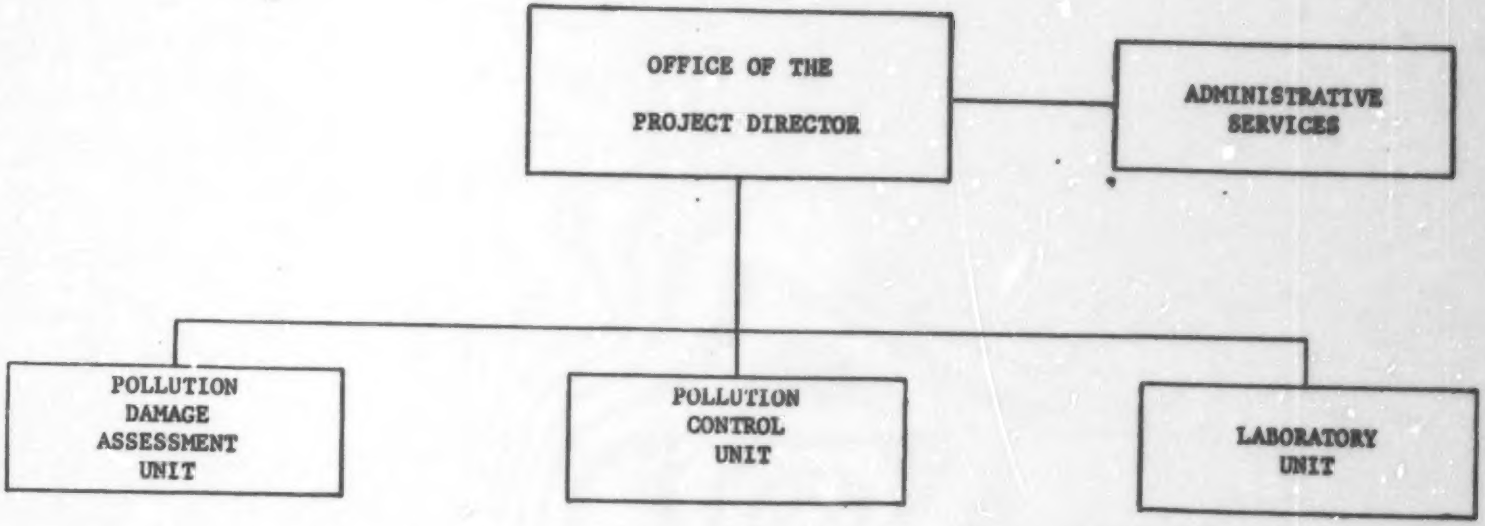


KEY

Bauer	-	Bauer
Str	-	Struzeski
Fitz	-	Fitzpatrick
Ru	-	Russell
Sak	-	Sacks
Cl	-	Clough
Sta	-	Stamato
Ma	-	Markey
E1	-	Replacement Engineer
E2	-	Replacement Engineer
E3	-	Replacement Engineer
Fr	-	Frame
Van	-	Van Nostrand
Bio	-	Biologist
Berg	-	Berg
Ncl	-	Nichols
Brn	-	Brown
Va	-	Varce

65-2

DIVISION OF WATER SUPPLY AND POLLUTION CONTROL
TECHNICAL SERVICES BRANCH
SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)


OFFICE OF THE PROJECT DIRECTOR
ADMINISTRATIVE SERVICES
POLLUTION DAMAGE ASSESSMENT UNIT
POLLUTION CONTROL UNIT
LABORATORY UNIT

FUNCTIONAL STATEMENT

SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

South Platte River Basin Enforcement Project

1. In cooperation with the Colorado State Department of Public Health determines the legitimate water uses and locates the sources of pollution having an adverse effect on these uses.

2. Determines through field investigations the physical, chemical, and biological responses of the River to pollution and evaluates the previously located sources of pollution with respect to the conditions in the River.

3. Determines wasteload reductions necessary to obtain desired water quality and recommends the water quality control measures needed to effect the desired wasteload reductions.

Office of the Project Director

1. Plans and directs the operations of the Project.

2. Directs administrative policy and procedures of the Project.

3. Coordinates reports developed by the Pollution Damage Assessment, the Pollution Control, and the Laboratory Units.

4. Plans and develops any necessary contractual arrangements.

5. Represents the Project in relationship with cooperating Federal, State, public and private entities.

Pollution Damage Assessment Unit

1. Conducts all field investigations, exclusive of municipal and industrial wastes investigations, necessary to collect data which will be used as a basis for Project recommendations.

2. Maintains full liaison with the Laboratory Unit in planning and scheduling of workloads.

3. Obtains hydrogeologic data to enable proper interpretation of field results.

4. Directs biological and bacteriological investigations.

5. Obtains samples for analyses by the Laboratory Unit.

6. Prepares reports of findings for inclusion in Project documents.

Functional Statement (continued)

Pollution Control Unit

1. Prepares and updates municipal and industrial water usage and waste discharge inventories.
2. Conducts municipal and industrial plant waste surveys.
3. Evaluates methods of handling, treating and abating municipal and industrial wastes discharges.
4. Develops, in conjunction with the Office of the Project Director and the Pollution Damage Assessment Unit, pollution abatement schedules.

Laboratory Unit

1. Provides full laboratory services to the Project.
2. Makes chemical analyses of samples collected by the Pollution Damage Assessment and Pollution Control Units.
3. Makes bacteriological analyses of water, soil, and vegetable samples collected by the Pollution Damage Assessment and Pollution Control Units.
4. Records and reviews results of collected data and assists the Project in preparing reports of findings.

STAFFING ROSTER
SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

Filled Permanent Positions: 1965 20; 1966 21

Unit Position and Title	Grade or Rank	Series	Position Number	Duty Station	Incumbent	Year of EOD	Year of Termination	Remarks
PROJECT HEADQUARTERS:								
OFFICE OF THE PROJECT DIRECTOR								
Project Director (Sr. San. Engr.)	GS-15	819	--	Denver, Colo.	M. A. Bauer, Jr.	1963	1967	
Adm. Officer	GS- 9	341	EH 63-385	Denver, Colo.	W. L. Veres	1964	1967	
Secretary (Steno)	GS- 5	318	#270	Denver, Colo.	M. H. Nicholls	1964	1967	
POLLUTION DAMAGE ASSESSMENT UNIT								
Chief (SE)	GS-14	819	--	Denver, Colo.	E.J. Struzeski, Jr.	1963	1967	
Geologist (Ground-Water)	GS-12	1350	EH 63-389	Denver, Colo.	R. L. Markey	1964	1967	
San. Engineer (SASE)	GS-11	--	--	Denver, Colo.	D. L. Clough	1964	1967	
Biologist	GS- 7	401	#274	Denver, Colo.	Vacant	1965	1967	Position presently being reclassified to GS-11
San.Engineer (ASE)	GS- 9	--	--	Denver, Colo.	T. D. Stamate	1963	1967	
Eng. Technician	GS- 5	820	#260	Denver, Colo.	N.N. Van Nostrand	1965	1967	
Clerk-Stenographer	GS- 4	312	#263	Denver, Colo.	R. D. Berg	1963	1967	
POLLUTION CONTROL UNIT								
Chief (SSE)	GS-14	819	--	Denver, Colo.	E. V. Fitzpatrick	1964	1967	
San Engineer (SASE) (Municipal)	GS-11	--	--	Denver, Colo.	J. D. Russell	1963	1967	
San.Engineer (SASE) (Industrial)	GS-11	--	--	Denver, Colo.	B. R.Sacks	1963	1967	

STAFFING ROSTER (continued)
SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

Unit Position and Title	Grade or Rank	Series	Position Number	Duty Station	Incumbent	Year of EOD	Year of Termi-nation	Remarks
POLLUTION CONTROL UNIT (continued)								
Eng. Draftsman	GS- 3	818	#64-10	Denver, Colo.	W. F. Fredrickson	1963	1965	WAE; works 20 hrs per week
Clerk	GS- 3	301	---	Denver, Colo.	A. M. Brown	1965	1967	Est. EOD 7/1/65
LABORATORY UNIT								
Chief	GS-13	1320	EH 63-438	Denver, Colo.	Vacant	--	--	Budget will not support
Deputy Chief	GS-12	403	EH 64-535	Denver, Colo.	R. H. Bordner	1963	1967	
Microbiologist (SANEO)	GS-11	403	--	Denver, Colo.	D. A. Brashear	1964	1967	
Chemist (Analytical)	GS-11	1320	EH 63-340IA	Denver, Colo.	L. T. McCarthy	1964	1967	
Chemist (Analytical)	GS-11	1320	EH 63-340	Denver, Colo.	B. R. Lemlich	1963	1967	
Chemist (SANEO)	GS-11	1320	--	Denver, Colo.	Fred M. Pfaffer	1963	1967	
Chemist	GS- 7	1320	EH 63-386	Denver, Colo.	M. D. Helming	1965	1967	Est. EOD 4/1/65
SUMMER EMPLOYEES								
San. Engr. COSTEP (JANEO)	GS- 7	403	--	Denver, Colo.	R. D. Harp	1965	1965	
Phys. Science Aide	GS-3/1	1311	64-13	Denver, Colo.	R. B. Simeral	1965	1965	
PART-TIME								
Economist	GS-12	110	--	Denver, Colo.	---	1965	1965	6 months only

PERSONAL SERVICES REQUEST FOR F.Y. 1965

Region and Location Region VIII - Denver, Colorado   Project No. and Title 568 - South Platte River Basin

Authorized F.Y. 1965 Positions:

Position Title	Incumbent	Grade 1/	Current Annual Rate	F.Y. 1965 Costs Compensation	F.Y. 1965 Costs Benefits	Remarks
Permanent Positions:						
Project Director	Bauer, M. A.	SSE+14	$ 11,443	$ 8,848	$ 2,652	
Administrative Officer	Vorce, W. L.	GS-9/3	7,710	7,831	616	
Secretary-Stenographer	Nicholls, M. H.	GS-5/7	5,990	5,833	399	
Chief, Pollution Damage Assessment Unit	Struzeski, E. J.	SE+6	9,202	7,640	2,494	
Geologist	Markey, R. L.	GS-12/1	10,250	10,438	796	
Sanitary Engineer	Clough, D. L.	SASE+6	8,838	6,676	2,327	EOD 7/1/64
Biologist	Vacant	GS-7		3,455	178	Position presently being reclassified to GS-11-Est EOD 7/1/65
Sanitary Engineer	Stamato, T. D.	ASE-2	5,093	3,333	1,837	
Engineering Technician	Van Nostrand, N.N.	GS-5/1	5,000	4,550	359	EOD 2/15/65
Clerk-Stenographer	Berg, R. D.	GS-4/2	4,630	4,588	396	
Chief, Pollution Control Unit	Fitzpatrick, E. V.	SSE+26	13,350	7,258	1,817	(Transferred to South Platte Project 11/1/64)
Sanitary Engineer	Russell, J. D.	SASE+3	7,546	5,487	2,327	
Sanitary Engineer	Sacks, Bernard R.	SASE+3	7,917	5,613	2,307	
Engineering Technician	Frame, D. H.	GS-5/9	6,320	6,344	396	EOD 7/1/64
Engineering Draftsman	Fredrickson, W. R.	GS-3/1	4,005	1,363	49	EOD 1/4/65 Part-time Emp
Deputy Chief, Laboratory Unit	Bordner, R. H.	GS-12/1	10,250	9,921	761	
Microbiologist	Brashear, David A.	SAHSO+8	8,783	6,920	2,085	
Chemist	McCarthy, L. T.	GS-11/1P	8,945	9,018	698	
Chemist	Lemlich, B. R.	GS-11/4P	9,830	9,873	723	
Chemist	Pfeffer, F. M.	SAHSO-2	6,079	4,189	1,986	
Chemist	Helming, M. D.	GS-7/1P	7,050	4,006	290	Est. EOD 4/1/65

PERSONAL SERVICES REQUEST FOR F.Y. 1965 (continued)

Position Title	Incumbent	Grade[1/]	Current Annual Rate	F.Y. 1965 Costs Compensation	F.Y. 1965 Costs Benefits	Remarks
Summer Employees						
COSTEP-Engineer	Harp, R. D.	JAHSO+8	$ 7,559	$ 1,168	$ 472	Terminated 9/11/64
Biological Aide	Lewis, S. L.	GS-3/1	4,005	662	24	Terminated 8/28/64
Mathematics Aide	Patten, Carolyn	GS-2/1	3,680	986	37	Terminated 9/4/64
Biological Aide	Richard, J. L.	GS-2/1	3,680	523	17	Terminated 8/14/64
Physical Science Aide	Simeral, R. B.	GS-2/1	3,680	959	35	Terminated 9/2/64
Biologist	Kanatani, F. H.	GS-5/1	5,000	1,561	53	Terminated 12/18/64
				$139,043	$26,131	

1/ For civil service indicate step-in-grade; for commissioned officers indicate years of service.

PERSONAL SERVICES REQUEST FOR F.Y. 1966

Region and Location Region VIII - Denver, Colorado Project No. and Title 568 - South Platte River Basin

Authorized F.Y. 1966 Positions Position Title	Incumbent	Grade 1/	Current Annual Rate	F.Y. 1966 Costs Compensation	 Benefits	Remarks
Project Director	Bauer, M. A.	SSE+14	$ 11,443	$ 8,979	$ 2,638	
Administrative Officer	Vorce, W. L.	GS-9/4	7,955	7,955	623	
Secretary-Stenographer	Nicholls, M. H.	GS-5/7	5,990	5,990	409	
Chief, Pollution Damage Assessment Unit	Struzeski, E. J.	SSE+8	10,215	7,751	2,638	
Geologist	Markey, R. L.	GS-12/2	10,605	10,749	816	
Sanitary Engineer	Clough, D. L.	SASE+6	8,838	6,826	2,309	
Biologist	Vacant	GS-11	8,650	8,650	673	Position presently being reclassified to GS-11. Est.EOD 7/1/65
Sanitary Engineer	Stamato, T. D.	ASE-2	5,093	3,377	1,838	
Engineering Technician	Van Nostrand, N. H.	GS-5/1	5,000	5,074	429	
Clerk-Stenographer	Berg, E. D.	GS-5/1	5,000	5,067	429	
Chief, Pollution Control Unit	Fitzpatrick, E. V.	SSE+26	13,350	10,887	2,638	
Sanitary Engineer	Russell, J. D.	SASE+3	7,917	5,943	2,309	
Sanitary Engineer	Zacks, B. R.	SASE+4	7,917	6,185	2,309	
Engineering Technician	Frame, D. H.	GS-7/4	6,650	6,650	537	Promotion 7/1/65
Engineering Draftsman	Fredrickson, W. R.	GS-3/1	4,005	2,000	73	Part-time employee
Clerk	Brown, A.	GS-3/6	4,680	4,680	396	Est. EOD 7/1/65
Deputy Chief, Laboratory Unit	Bordner, R. H.	GS-12/1	10,250	10,476	798	
Microbiologist	Brashear, D. A.	SAHSO+8	8,783	6,979	2,008	
Chemist	McCarthy, L. T.	GS-11/2P	8,945	9,279	717	
Chemist	Lemlich, B. R.	GS-11/4P	9,830	9,960	728	
Chemist	Pfeffer, F. M.	SAHSO-2	6,079	4,925	2,009	
Chemist	Helming, M. D.	GS-7/1P	7,050	7,050	565	Est. EOD 4/1/65

PERSONAL SERVICES REQUEST FOR F.Y. 1966 (continued)

Position Title	Incumbent	Grade 1/	Current Annual Rate	F.Y. 1966 Costs Compensation	 Benefits	Remarks
Summer Employment						
COSTEP-Engineer	Harp, R. D.	JAHSO+8	$ 7,857	$ 1,217	$ 464	
Physical Science Aide	Simeral, R. B.	GS-3/1	4,005	842	31	
Part-time Employment						
Economist	---	GS-12/4	11,315	5,658	428	6 months only Est. EOD 7/1/65
3 SE Replacements for:	Russell, J. D.	SASE+2	7,917	1,353	582	Est. EOD 7/1/65
	Sacks	SASE+2	7,917	1,353	582	Est. EOD 7/1/65
	Stamato	ASE+2	6,327	1,153	471	Est. EOD 7/1/65
				$ 167,008	$ 30,447	

1/ For civil service indicate step-in-grade; for commissioned officers indicate years of service

SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

PERSONNEL SUMMARY

	Fiscal Year 1964			Fiscal Year 1965			Fiscal Year 1966		
	Project Hdqtrs	Lab	Total	Project Hdqtrs	Lab	Total	Project Hdqtrs	Lab	Total
Number of Permanent Positions	14	6	20	14	6	20	15	6	21
Number of Filled Permanent Positions - End of Year	12	6	18	14	6	20	15	6	21
Number of Filled Other Than Permanent Positions - End of Year	4	1	5	2	1	3	2	1	3
Total Permanent Man-Years	7.4	2.2	9.6	13.0	5.8	18.8	14.9	5.9	20.8
Total Other Than Permanent Man-Years	.2	.1	.3	1.4	.3	1.7	1.0	.3	1.3

ANALYSIS OF 1965 VACANCIES
SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

Total Number of Permanent Positions Allowance	23
Total Filled Positions as of January 1, 1965 (Actual)	18
Unfilled Positions as of January 1, 1965	5

	Grade or Rank	Series	Position Number	Duty Station	Candidate	Estimated EOD	Recruitment Action Requested	Remarks
Chief, Lab Unit	GS-13	1320	EH-63-438	Denver, Colo.	None	--	--	Budget will not support
Biologist	GS- 7	401	274	Denver, Colo.	E. G. Karvelis	7/1/65	Yes	Being reclassified to GS-11
Chemist	GS- 7	1320	EH-63-386	Denver, Colo.	M. G. Helming	4/1/65	Yes	Being considered for this position

WORKING BUDGET
Request for Funds, Fiscal Years 1965 and 1966

Project Name: SOUTH PLATTE RIVER BASIN PROJECT (Enforcement)

	1965 Estimate	1966 Estimate	Increase or Decrease
1. Request			
11 Personnel Compensation (Total)	$139,043	$167,008	+ 27,965
Compensation other than Consultants	---	---	---
Consultants' Fees	2,000	---	- 2,000
12 Personnel Benefits	26,131	30,447	+ 4,316
21 Travel			
Change of station including dependents and dislocation allowance	185	750	+ 565
Other Travel	10,000	12,500	+ 2,500
22 Transportation of Things			
Change of Station	---	1,000	+ 1,000
Other	2,000	795	- 1,205
23 Rents, Communications and Utilities (do not include space rental)	3,000	3,000	---
24 Printing and Reproduction	2,000	2,500	+ 500
25 Other Services			
*Contracts (itemize)	---	13,000	+ 13,000
Other	141	500	+ 359
26 Supplies and Materials	6,500	4,500	- 2,000
31 Equipment (itemize and justify)**	1,500	1,500	---
	$192,500	$237,500	+ 45,000

*Contract for glassware washing and media preparation at Colorado State Department of Public Health for Project laboratory.

Includes $9,000 contract for salinity program with U. S. Geological Survey which provides for establishing flow stations, etc.

**Miscellaneous small equipment and replacements needed for Project

ANALYSIS by ACTIVITY
SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

		Project Headquarters	
Activity	**OC**	**FY 1965**	**FY 1966**
Project Direction and Administration	11	$ 30,500	$ 32,000
	25	2,000	3,000
Projections:			
Economics	11	---	6,500
Engineering	11	50,350	56,000
	25	1,500	2,500
Ground-Water and Biological Studies	11	16,500	21,500
	25	1,500	2,500
Drafting and Map Reproduction	11	1,500	2,000
	25	2,000	2,500
Environmental Measurements			
Lab Services	11	49,750	53,250
	25	3,500	8,000*
Equipment	25	1,500	1,500
Inventory	25	1,000	1,000
Measurements and Water Sampling	11	10,500	12,750
	25	3,500	4,500
Data Analysis and Evaluation	11	10,750	12,500
	25	6,150	15,500**
Total		$192,500	$237,500

*Includes $4,000 contract for glassware washing and media preparation for laboratory located at Colorado State Department of Public Health.

**Includes $9,000 contract for salinity program with U. S. Geological Survey which provides for establishing flow stations and rating of these stations at specified time intervals. In addition, complete inorganic mineral analyses of collected samples under existing conditions will also be provided.

SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)
ANALYSIS OF EXTERNAL EXPENSES
F.Y. 1965-F.Y. 1966

Recipient	Description of Work	Method of Payment	Amount	
			1965 Estimate	1966 Estimate
General Services Administration	car rental	R	$ 4,000	$ 4,000
General Services Administration	utilities	R	3,000	3,000
Government Printing Office	report and map reproduction	R	2,000	3,000
U. S. Geological Survey	salinity program	C	-0-	9,000
Private individuals	consulting services	P	2,000	1,000
Colorado State Department of Public Health	glassware washing and media preparation	C	-0-*	4,000
Various firms	goods and services	P	7,000	6,000
			$18,000	$ 30,000

C - contract
R - reimbursement
P - purchase order
O - other (specify)

*Contract No. PH 86-64-97 dated May 19, 1964 in the amount of $4,665.60 covers the period of services from May 19, 1964 through July 14, 1965 for glassware washing and media preparation at the laboratory.

SUPPLIES AND EQUIPMENT AVAILABLE FOR TRANSFER
F. Y. 1965 - 1966
SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

None

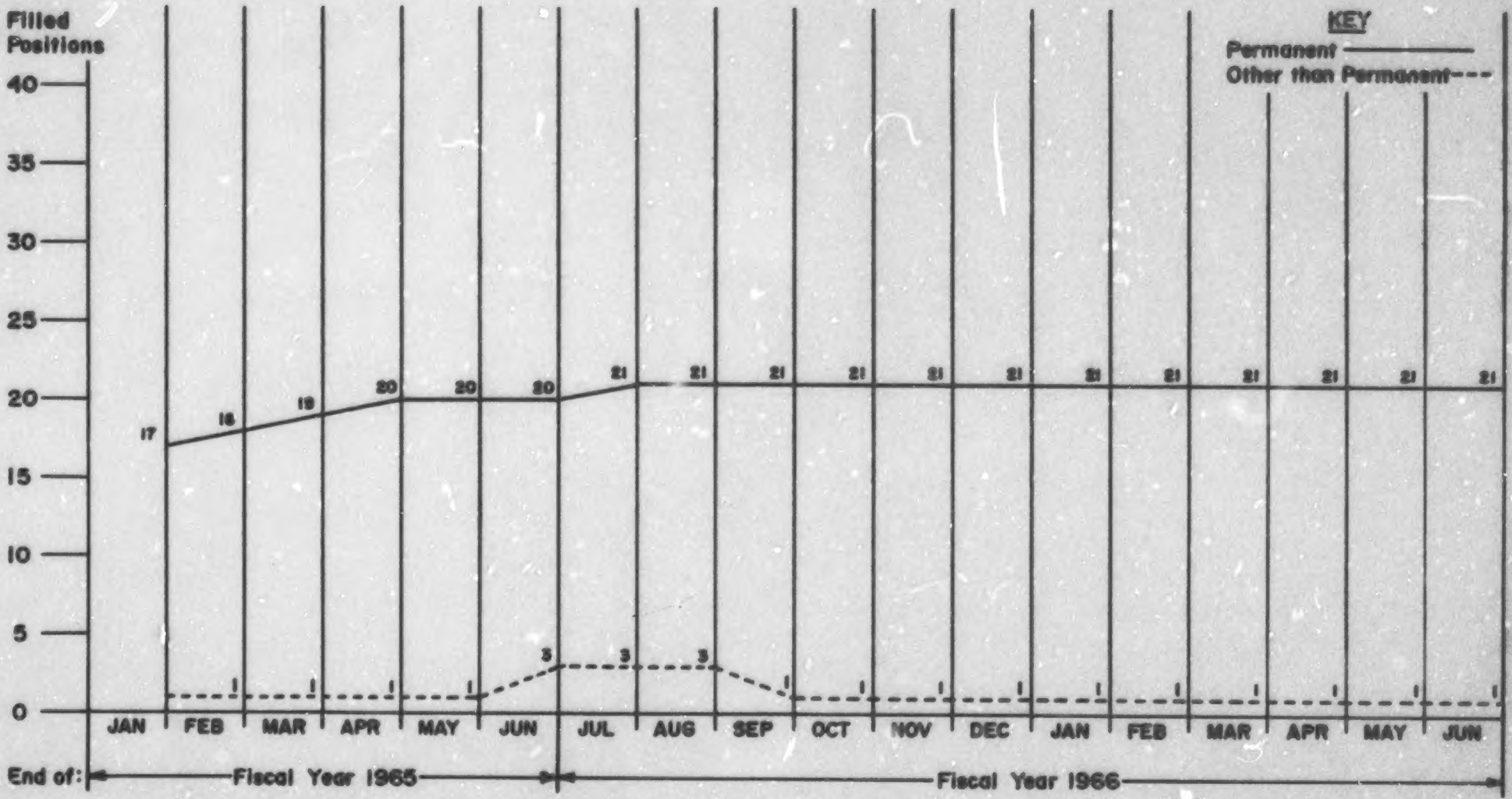
ANALYSIS OF EXISTING AND PROJECTED SPACE
F.Y. 1965 - 1966 - 1967

SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

Major Organizational Unit	Location	Utilization	Square Feet	Estimated Cost Annual			Rent and/or Utilities	Date of Occupancy	Bureau Approval Obtained	Remarks
				1965	1966	1967				
I Project Headquarters	Equitable Building 730 - 17th Street Eighth Floor Denver, Colorado	Office for major hdq components (G)	2,104	7,618	*	*	Rent	11/5/63	Yes	
	Rooms #65 and #151 Colorado State Dept. of Public Health 4210 E. 11th Avenue Denver, Colorado	Laboratory (S)	594	--	--	--	Govt. Owned (State)	11/1/63	Yes	

*Anticipated Project Headquarters will occupy space in Government owned facilities beginning 5/1/65

PROJECTED MONTHLY EMPLOYMENT
SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)



III. POPULATION

SOUTH PLATTE RIVER BASIN PROJECT
(Enforcement)

State of Colorado - Total Population, U. S. Census

1940	-	1,123,296
1950	-	1,325,089
1960	-	1,753,947

Project Study Area - Colorado

Total Population, 1960	-	Approximately 1,124,000
Estimated Population, 1964	-	Approximately 1,400,000

Population by Municipalities - Over 10,000 population

Municipality	1940	1950	1960
Arvada	--	--	19,242
Aurora	3,437	11,421	48,548
Boulder	12,958	19,999	37,718
Denver	322,412	415,786	493,887
Englewood	9,680	16,869	33,398
Fort Collins	12,251	14,937	26,695
Greeley	15,995	20,354	26,314
Lakewood	--	--	19,338
Littleton	2,244	3,378	13,670
Longmont	7,[illegible]06	8,099	11,489
Sterling	7,411	7,534	10,751
Thornton	--	--	11,353
Westminster	534	1,686	13,850
Wheatridge	--	--	21,619

Total Land Area

South Platte River Basin Study Area - Colorado

19,450 Square Miles

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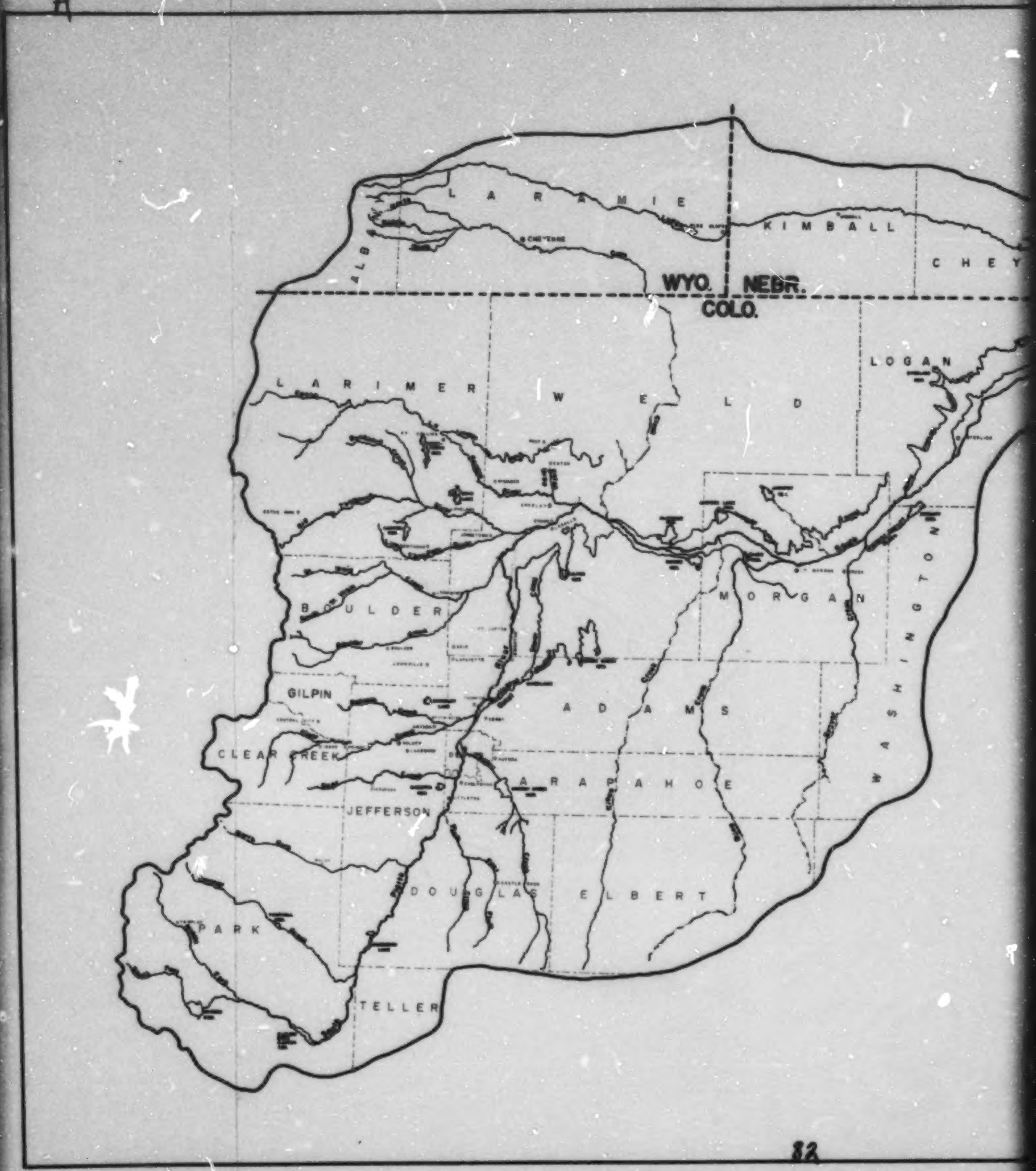
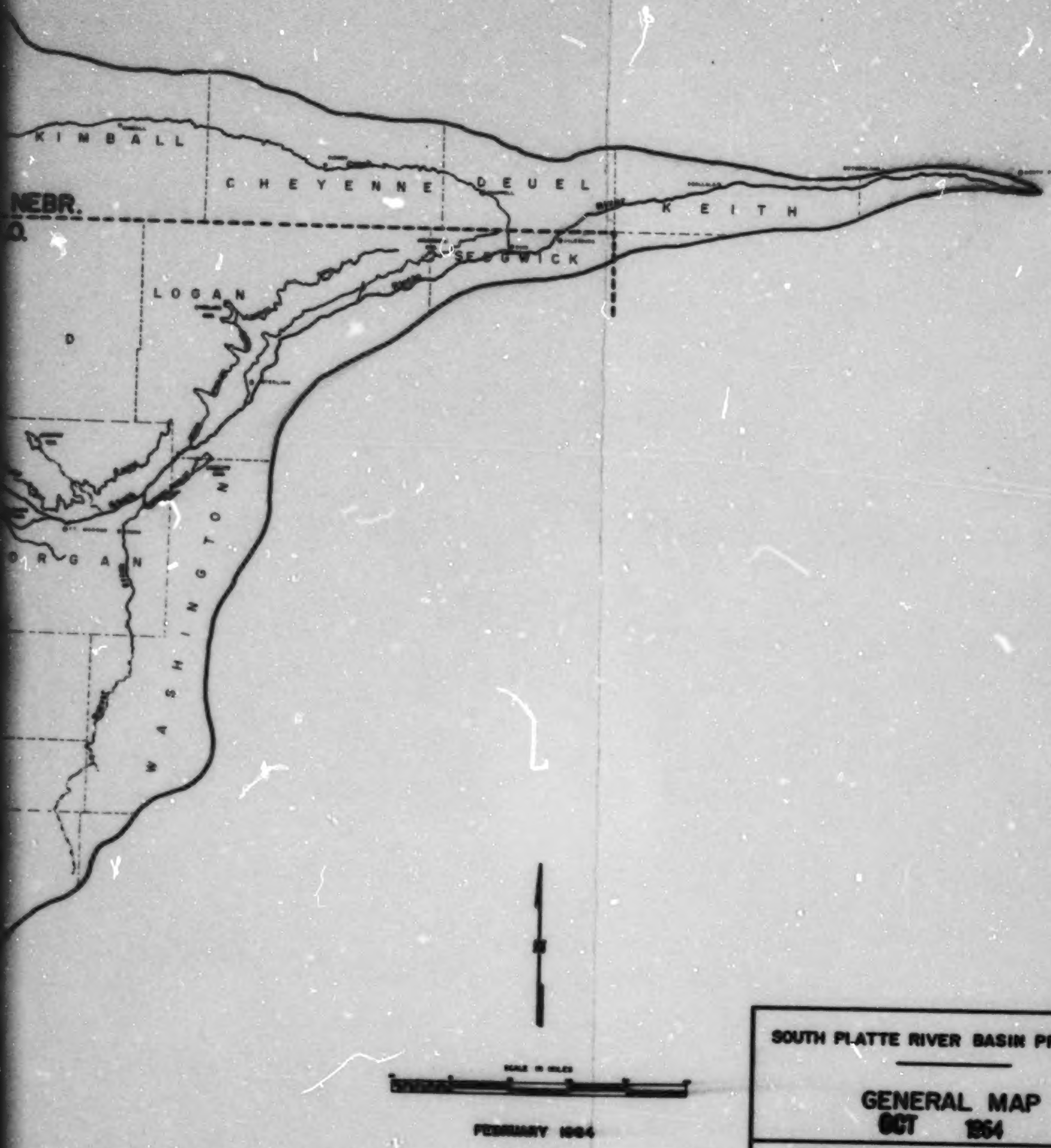

LARAMIE
ALBANY
CHEYENNE
KIMBALL
CHEY
WYO.
NEBR.
COLO.
LARIMER
WELD
LOGAN
MORGAN
BOULDER
GILPIN
ADAMS
WASHINGTON
CLEAR CREEK
ARAPAHOE
JEFFERSON
DOUGLAS
ELBERT
PARK
TELLER

B


KIMBALL
CHEYENNE
DEUEL
KEITH
NEBR.
O.
LOGAN
SEDGWICK
D
ORGAN
WASHINGTON
Y
SCALE IN MILES
FEBRUARY 1964

SOUTH PLATTE RIVER BASIN PROJECT

GENERAL MAP
OCT 1964

DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION VIII DENVER, COLO.

FIGURE

82

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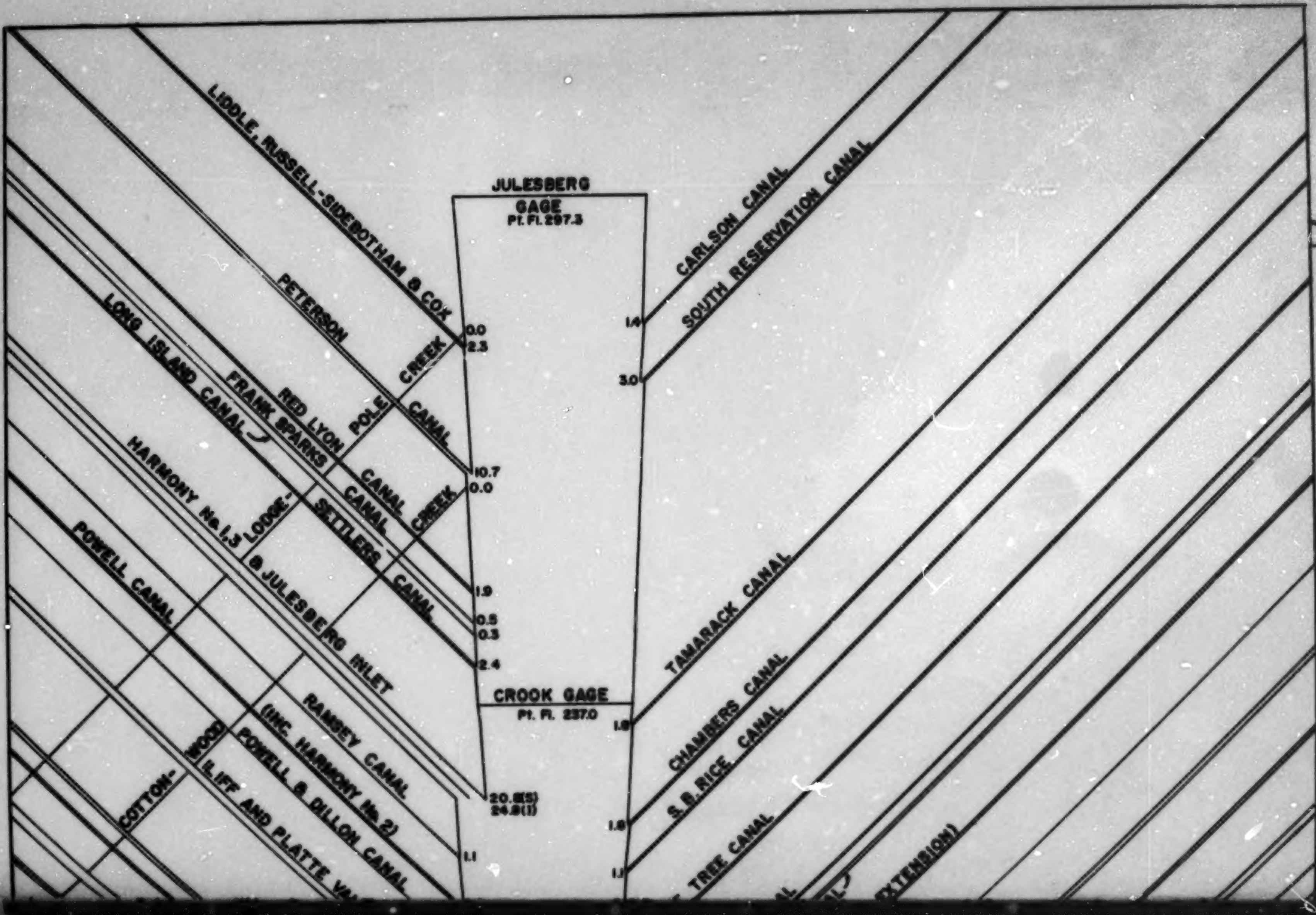
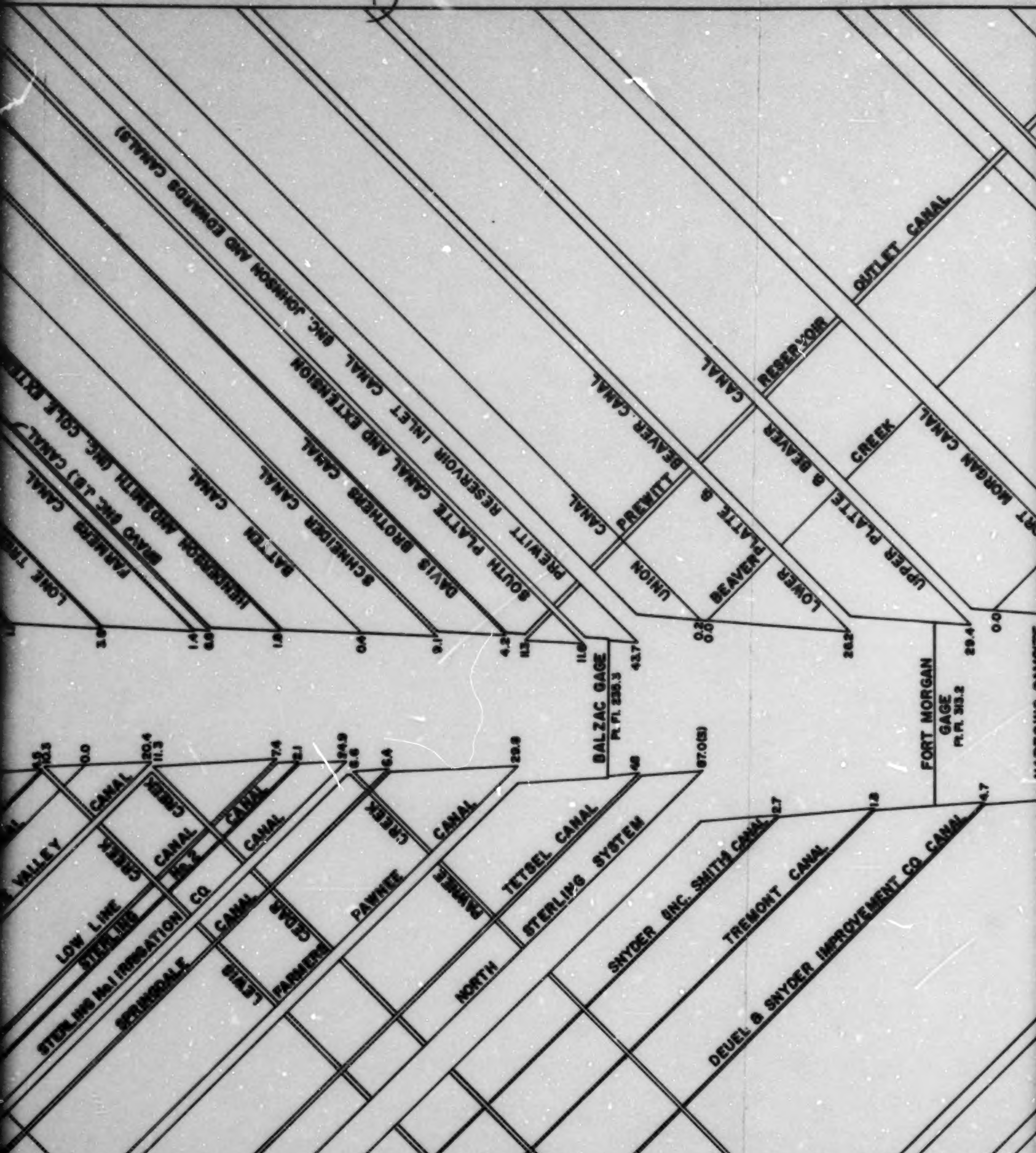
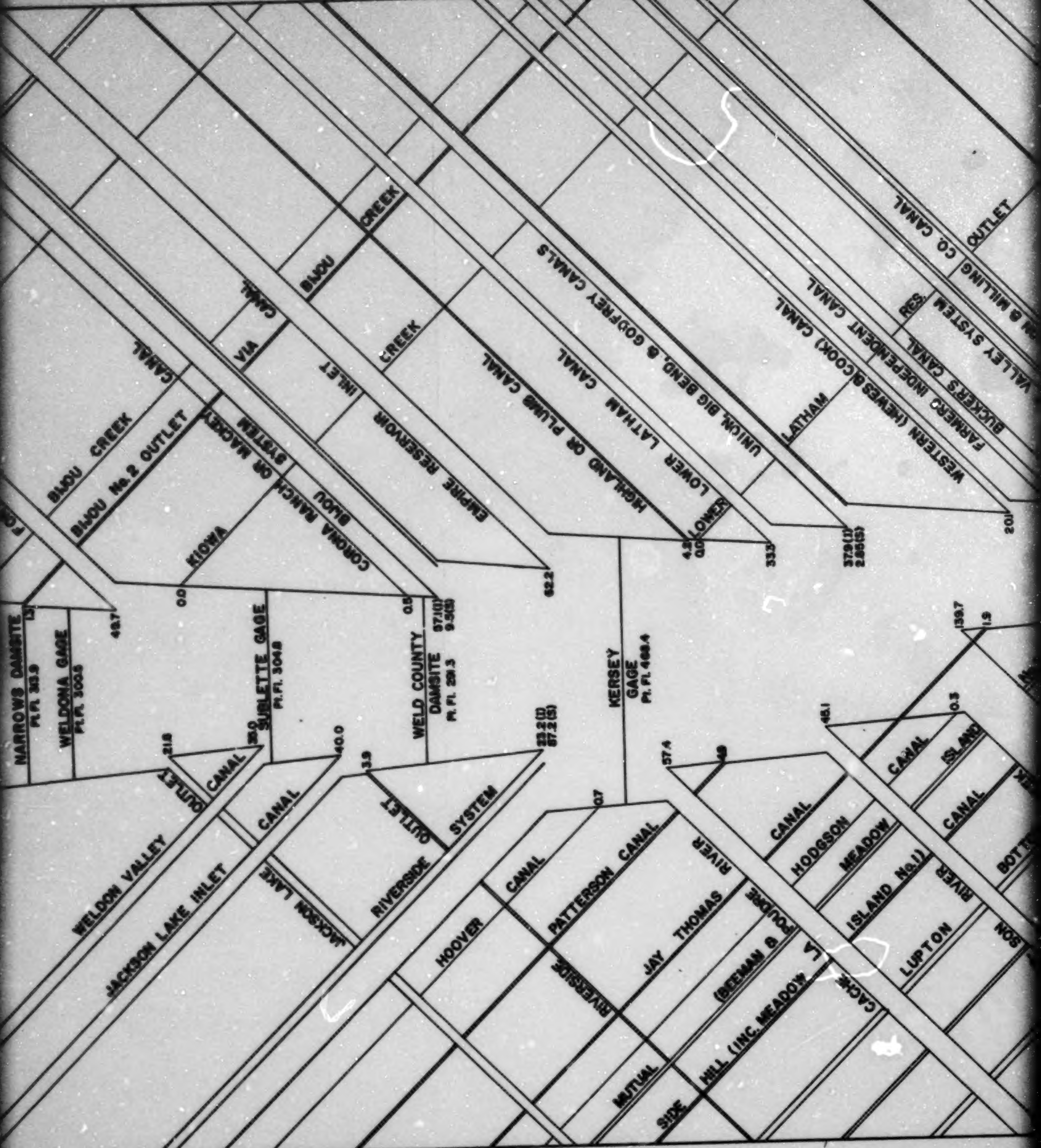

JULESBERG GAGE
Pt. Fl. 297.3
CROOK GAGE
Pt. Fl. 237.0
LIDDLE, RUSSELL-SIDEBOTHAM & COX
PETERSON
CREEK
POLE
CANAL
RED LYON
FRANK SPARKS
CANAL
CREEK
CANAL
LONG ISLAND CANAL
HARMONY No. 1, 3
LODGE-
SETTLERS
CANAL
& JULESBERG INLET
POWELL CANAL
RAMSEY CANAL
(INC. HARMONY No. 2)
COTTON-
WOOD
POWELL & DILLON CANAL
ILIFF AND PLATTE VA
CARLSON CANAL
SOUTH RESERVATION CANAL
TAMARACK CANAL
CHAMBERS CANAL
S. B. RICE CANAL
TREE CANAL
EXTENSION)
0.0
2.3
10.7
0.0
1.9
0.5
0.3
2.4
20.8(S)
24.8(I)
1.1
1.4
3.0
1.8
1.8
1.1

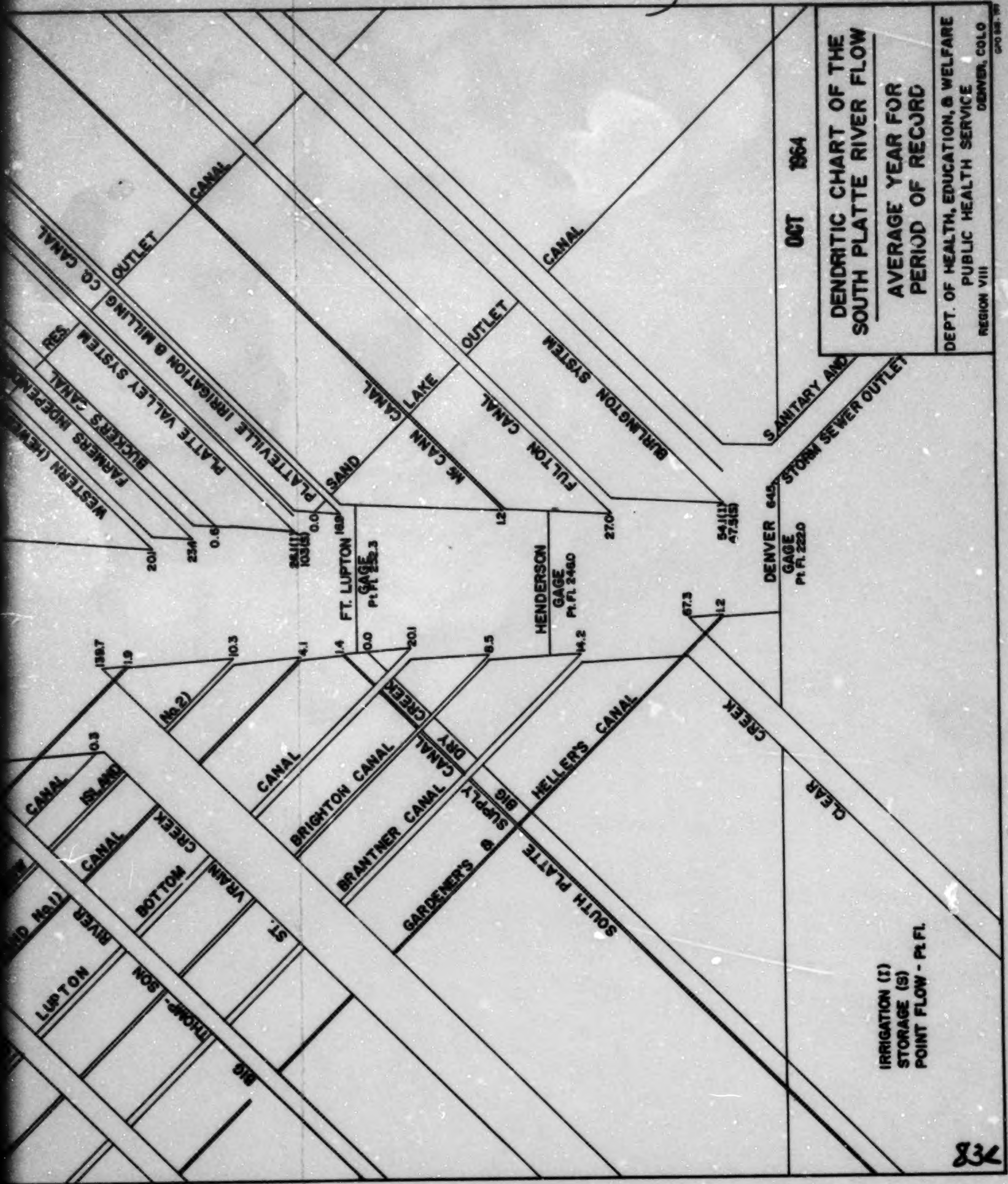
B


PREWITT RESERVOIR INLET CANAL (INC. JOHNSON AND EDWARDS CANALS)
SOUTH PLATTE CANAL AND EXTENSION
DAVIS BROTHERS CANAL
SCHNEIDER CANAL
BATTEN CANAL
HENDERSON AND SMITH (INC. COLE EXT
BRAVO (INC. J.B.) CANAL
FARMERS CANAL
LONE TREE
CANAL
UNION
PREWITT
BEAVER CANAL
BEAVER
PLATTE & BEAVER
CANAL
LOWER
PLATTE & BEAVER
UPPER PLATTE
CREEK
RESERVOIR
OUTLET CANAL
MORGAN CANAL
3.0
1.4
0.0
1.8
0.4
9.1
4.2
11.5
11.6
43.7
0.2
0.0
26.2
29.4
0.0
BALZAC GAGE
R. Fl. 235.3
FORT MORGAN
GAGE
R. R. 313.2
4.5
10.3
0.0
20.4
11.3
7.4
2.1
24.9
6.6
6.4
29.8
48
87.0(S)
2.7
1.8
4.7
VALLEY
CANAL
LOW LINE
STERLING
CREEK
CANAL
No.2
CREEK
CANAL
STERLING No.1 IRRIGATION CO.
CANAL
SPRINGDALE
CANAL
LEWIS
CEDAR
FARMERS
PAWNEE
CREEK
CANAL
PAWNEE
TETSEL CANAL
NORTH
STERLING SYSTEM
SNYDER (INC. SMITH) CANAL
TREMONT CANAL
DEUEL & SNYDER IMPROVEMENT CO. CANAL

C


CO. CANAL
OUTLET
& MILLING
VALLEY SYSTEM
RES.
BUCKERS CANAL
FARMERS INDEPENDENT CANAL
WESTERN (HEWES & COOK) CANAL
LATHAM
UNION, BIG BEND, & GODFREY CANALS
LOWER LATHAM CANAL
LOWER
HIGHLAND OR PLUMB CANAL
BIJOU
CREEK
CREEK
INLET
EMPIRE RESERVOIR
CANAL
VIA
BIJOU SYSTEM
OR MACKEY
CORONA RANCH
BIJOU
KIOWA
BIJOU No.2 OUTLET
BIJOU CREEK
CANAL
4.2
0.0
33.3
37.9(I)
2.85(S)
20.1
62.2
0.8
57.1(I)
9.5(S)
0.0
49.7
NARROWS DAMSITE
Pt. Fl. 313.9
WELDONA GAGE
Pt. Fl. 300.6
SUBLETTE GAGE
Pt. Fl. 304.8
WELD COUNTY
DAMSITE
Pt. Fl. 291.3
KERSEY
GAGE
Pt. Fl. 468.4
139.7
1.9
21.8
25.0
40.0
3.9
23.2(I)
87.2(S)
0.7
57.4
46.1
0.3
WELDON VALLEY
OUTLET
CANAL
JACKSON LAKE INLET
CANAL
JACKSON LAKE
RIVERSIDE
OUTLET
SYSTEM
HOOVER
CANAL
PATTERSON CANAL
RIVERSIDE
JAY THOMAS
RIVER
POUDRE
(BEEMAN &
CACHE LA
MUTUAL
SIDE HILL (INC. MEADOW
CANAL
HODGSON
MEADOW
ISLAND No.1)
CANAL
ISLAND
CANAL
LUPTON
RIVER
SON

D



DENDRITIC CHART OF THE SOUTH PLATTE RIVER FLOW

AVERAGE YEAR FOR PERIOD OF RECORD

OCT 1964

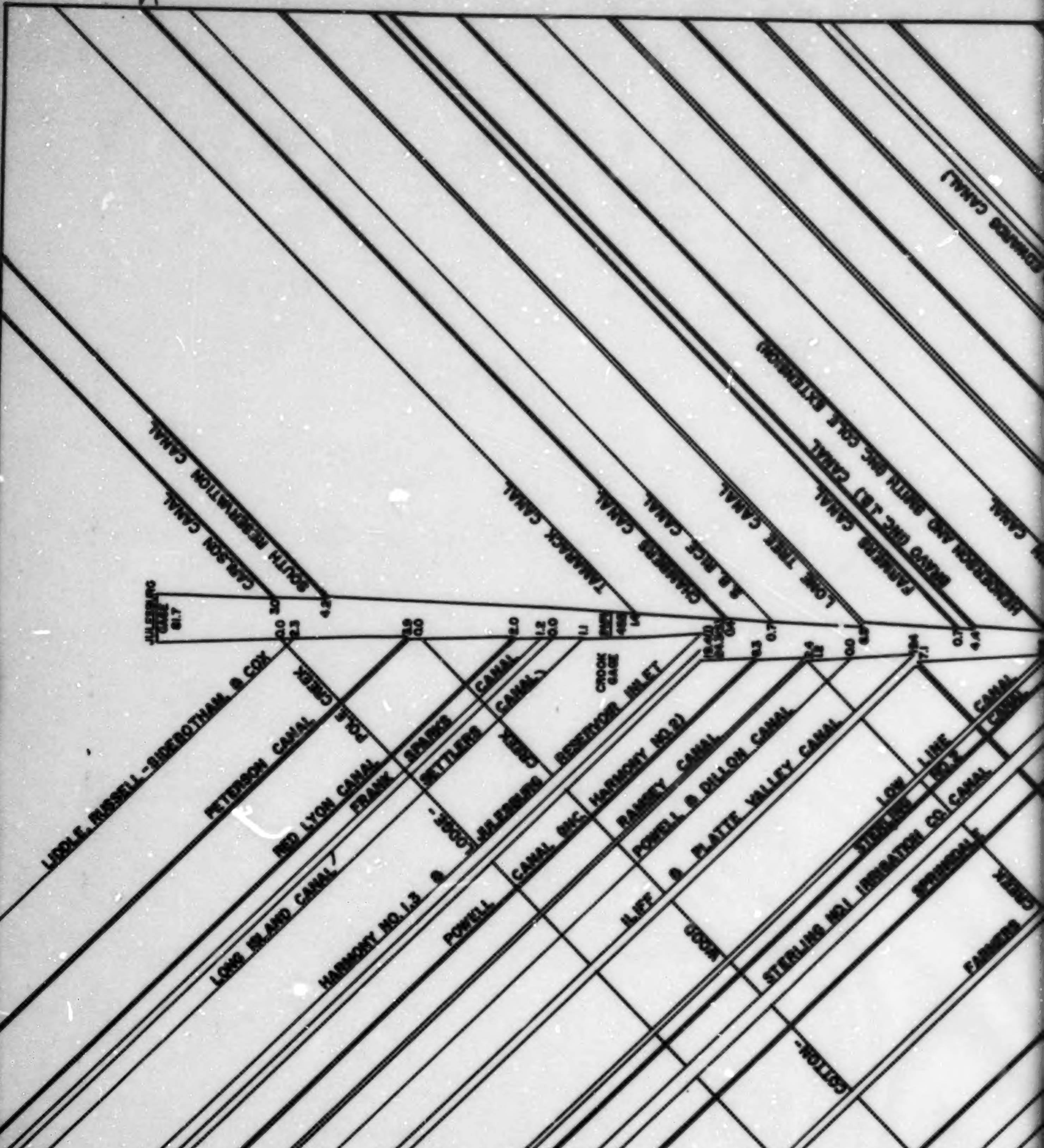
DEPT. OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION VIII
DENVER, COLO

IRRIGATION (I)
STORAGE (S)
POINT FLOW - Pt. Fl.

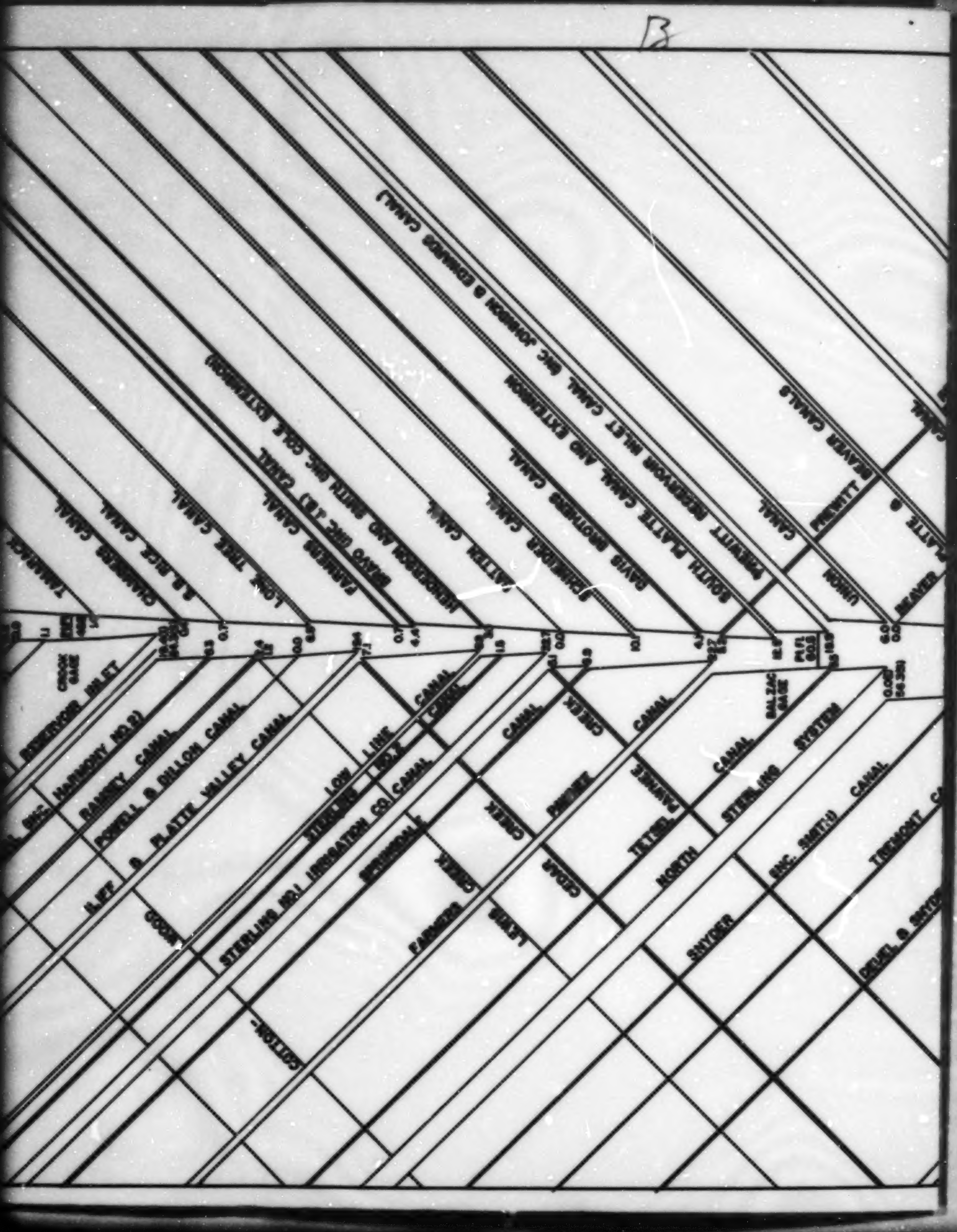
CANAL
OUTLET
CO. CANAL
PLATTEVILLE IRRIGATION & MILLING
PLATTE VALLEY SYSTEM
RES.
BUCKERS CANAL
FARMERS INDEPEN
WESTERN (HEWE
SAND
LAKE
OUTLET
CANAL
MC CANN CANAL
FULTON CANAL
BURLINGTON SYSTEM
CANAL
SANITARY AND
STORM SEWER OUTLET
20.1
23.4
0.6
26.1(I)
10.3(S)
0.0
16.0
12
27.0
54.1(I)
47.3(S)
64.5
FT. LUPTON GAGE Pt. Fl. 252.3
HENDERSON GAGE Pt. Fl. 246.0
DENVER GAGE Pt. Fl. 222.0
139.7
1.9
10.3
4.1
1.4
0.0
20.1
8.5
14.2
87.3
1.2
0.3
CANAL
ISLAND
CANAL
No. 2)
CANAL
BRIGHTON CANAL
DRY CREEK
CANAL
BRANTNER CANAL
BIG SUPPLY
GARDENER'S &
HELLER'S CANAL
SOUTH PLATTE
CLEAR CREEK
ST. VRAIN CREEK
BOTTOM
CANAL
RIVER
AND No. 1)
LUPTON
BIG THOMPSON

83c

1A

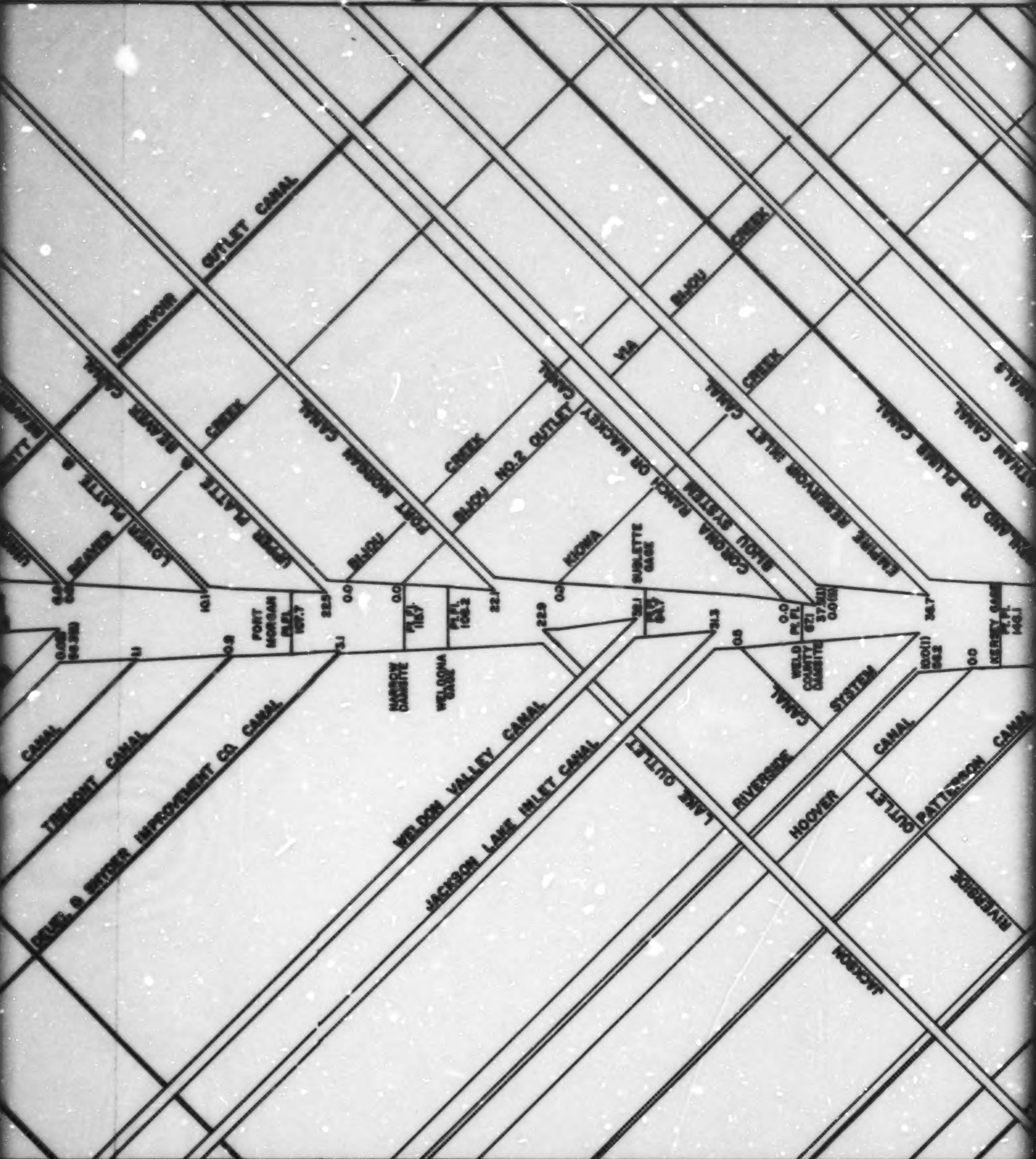

EDWARDS CANAL)
(HORNBERGER EXTENSION)
HENDERSON AND SMITH (INC. COLE EXTENSION)
BRAVO (INC. J.E.T.) CANAL
FARMERS CANAL
LONE TREE CANAL
S.S. RICE CANAL
CHAMBERS CANAL
TAMARACK CANAL
SOUTH RESERVATION CANAL
CARLSON CANAL
JULESBURG GAGE 81.7
CROOK GAGE
LIDDLE, RUSSELL-SIDEBOTHAM & COX
PETERSON CANAL
POLE CREEK
RED LYON CANAL
FRANK SPARKS CANAL
SETTLERS CANAL
CROW CREEK
LONG ISLAND CANAL
HARMONY NO.1,3 & JULESBURG (COOP.-
JULESBURG RESERVOIR INLET
POWELL CANAL INC.
HARMONY NO.2)
RAMSEY CANAL
POWELL & DILLON CANAL
ILIFF & PLATTE VALLEY CANAL
LOW LINE CANAL
STERLING NO.2 CANAL
STERLING NO.1 IRRIGATION CO. CANAL
SPRINGDALE CANAL
COTTON-WOOD
FARMERS
CREEK

B

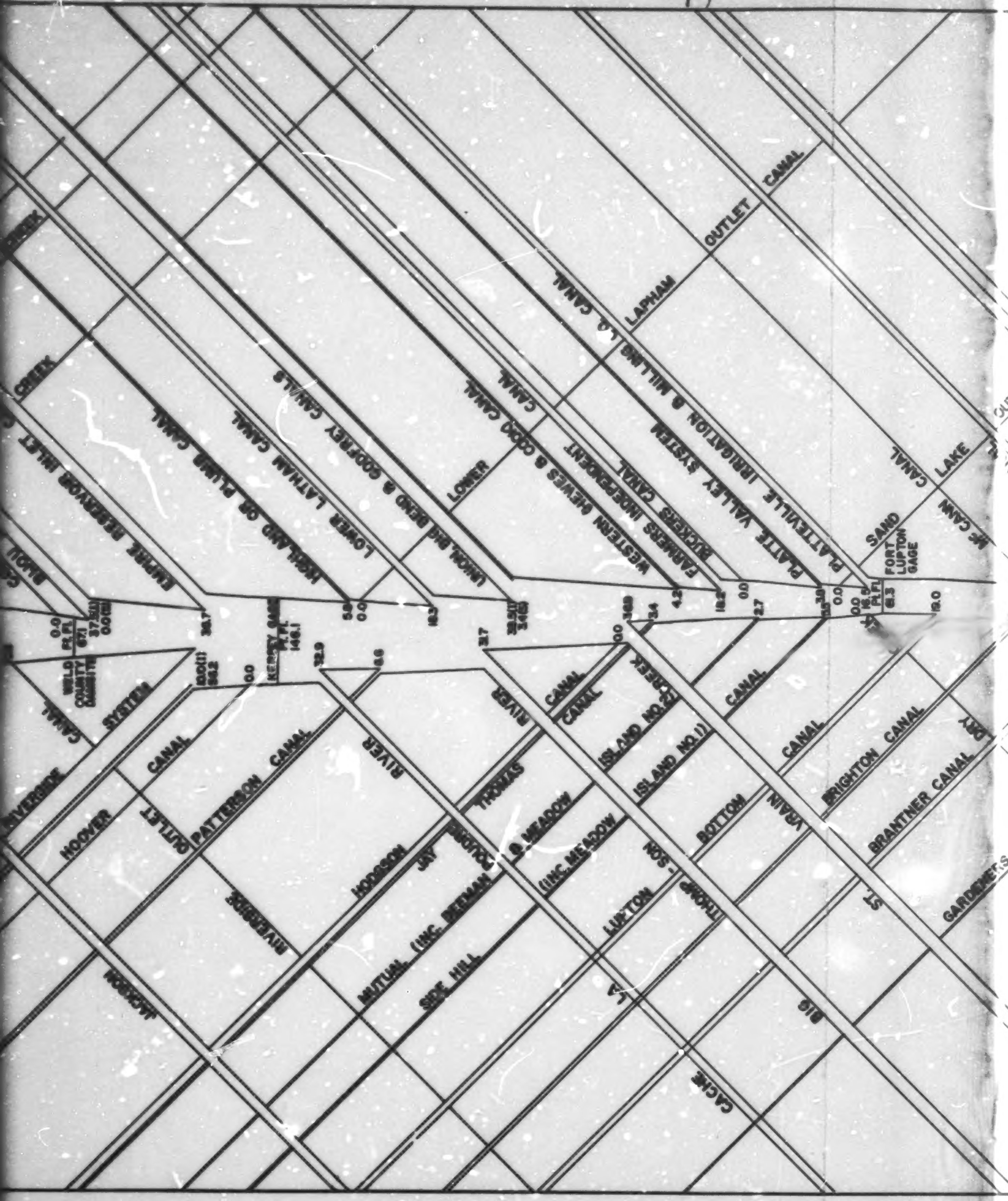


TAMARACK
CHAMBERS CANAL
S.B. RICE CANAL
LONE TREE CANAL
FARMERS CANAL
BRAVO (INC. J.E.T.) CANAL
HENDERSON AND SMITH (INC. COLE EXTENSION)
PATTEN CANAL
SCHNEIDER CANAL
DAVIS BROTHERS CANAL
SOUTH PLATTE CANAL AND EXTENSION
PREWITT RESERVOIR INLET CANAL (INC. JOHNSON & EDWARDS CANAL)
UNION CANAL
PREWITT
BEAVER CANALS
BEAVER
PLATTE &
CANAL
CROOK GAGE
RESERVOIR INLET
INC. HARMONY NO.2)
RAMSEY CANAL
POWELL & DILLON CANAL
ILIFF & PLATTE VALLEY CANAL
GOOD
LOW LINE CANAL
STERLING NO.1 IRRIGATION CO. CANAL
SPRINGDALE
CREEK
FARMERS
LEFT
CREEK CANAL
CEDAR CREEK
PAWNEE CANAL
PAWNEE
TETSEL
NORTH STERLING CANAL
BALZAC GAGE
STERLING SYSTEM
(INC. SMITH) CANAL
SNYDER
TREMONT CA
DEUEL & SNYD
COTTON-
P.L.F.L. 60.8

C

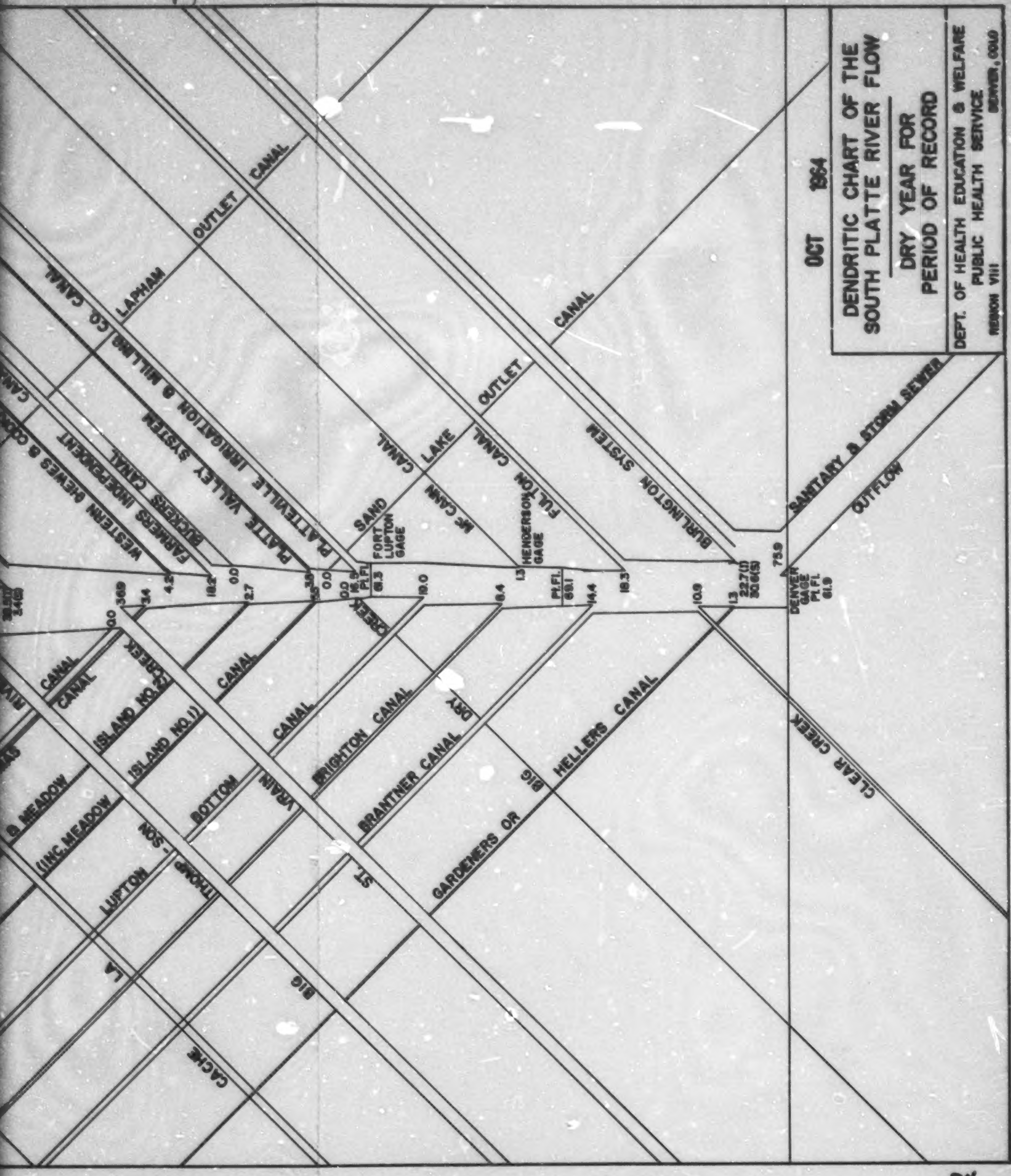

RESERVOIR OUTLET CANAL
UPPER PLATTE & BEAVER CANAL
LOWER PLATTE & BEAVER
BEAVER
CREEK
FORT MORGAN CANAL
BIJOU
BIJOU NO. 2 OUTLET
CREEK
CORONA RANCH OR MACKEY CANAL
KIOWA
BIJOU SYSTEM
VIA
BIJOU
CREEK
CREEK
EMPIRE RESERVOIR INLET CANAL
RIVERSIDE CANAL
BIJOU CREEK
ILAND OR PLUMB CANAL
CANAL
TREMONT CANAL
DEUEL & SNYDER IMPROVEMENT CO. CANAL
WELDON VALLEY CANAL
JACKSON LAKE INLET CANAL
LAKE OUTLET
JACKSON
CANAL
RIVERSIDE
SYSTEM
HOOVER
CANAL
OUTLET
PATTERSON CANAL
RIVERSIDE
FORT MORGAN
PL.FL.
197.7
PL.FL.
115.7
PL.FL.
106.2
NARROW DAMSITE
WELDONA GAGE
SUBLETTE GAGE
WELD COUNTY DAMSITE
PL.FL.
67.1
KERSEY GAGE
PL.FL.
146.1
10.1
22.5
0.0
0.0
22.1
22.9
0.0
21.3
0.5
0.0
37.5
0.0
36.7
0.0
94.2
0.9
1.1
3.1

D


CREEK
CREEK
BIJOU
EMPIRE RESERVOIR INLET
HIGHLAND OR PLUMB CANAL
LOWER LATHAM CANAL
UNION, BIG BEND & GODFREY CANALS
LOWER
CANAL
WESTERN GHEWES & GOOD CANAL
FARMERS INDEPENDENT
BUCKERS CANAL
PLATTE VALLEY SYSTEM
PLATTEVILLE IRRIGATION & MILLING L.D. CANAL
LAPHAM
OUTLET
CANAL
SAND
CANAL
LAKE
OUTLET
MC CANN
FORT LUPTON GAGE
HENDERSON GAGE
WELD COUNTY DAMSITE
KERSEY GAGE
P.FL
0.0
67.1
37.5(1)
0.0(2)
38.7
100.1(1)
38.2
0.0
146.1
32.9
8.6
5.9
0.0
16.3
28.5(1)
34(2)
37.7
0.0
39.8
3.4
4.2
18.2
0.0
2.7
30
0.0
0.0
16.5
61.3
19.0
13
CANAL
SYSTEM
RIVERSIDE
HOOVER
CANAL
OUTLET
PATTERSON CANAL
RIVER
RIVER
RIVERSIDE
JACKSON
HODGSON
JAY THOMAS
MUTUAL (INC. BEEMAN & MEADOW
SIDE HILL
CANAL
CANAL
ISLAND NO.2
ISLAND NO.1
(INC. MEADOW
CREEK
LUPTON
BOTTOM
CANAL
ST. VRAIN
BIG
CACHE
BRIGHTON CANAL
BRANTNER CANAL
DRY
GARDENERS OR BIG

D

E



LAPHAM OUTLET CANAL
CO. CANAL
PLATTEVILLE IRRIGATION & MILLING
PLATTE VALLEY SYSTEM
BUCKERS CANAL
FARMERS INDEPENDENT
WESTERN DIEWES & COOK
CANAL
SAND LAKE CANAL
FORT LUPTON GAGE
McCANN CANAL
OUTLET CANAL
FULTON
HENDERSON GAGE
BURLINGTON SYSTEM
SANITARY & STORM SEWER
OUTFLOW
DENVER GAGE Pl.Fl. 61.9
75.9
22.7(I)
30.6(S)
1.3
10.9
18.3
14.4
Pl.Fl. 68.1
1.3
8.4
19.0
61.3
Pl.Fl.
16.5
0.0
0.0
3.8
2.7
0.0
18.2
4.2
3.4
36.9
0.0
36.5(I)
3.4(S)
CREEK
CANAL
CANAL
ISLAND NO.2
ISLAND NO.1
CREEK
CANAL
RIVE
MEADOW
(INC. MEADOW
LUPTON BOTTOM
THOMP-SON
VRAIN CANAL
ST.
BRIGHTON CANAL
BRANTNER CANAL
DRY CREEK
GARDENERS OR BIG HELLERS CANAL
CLEAR CREEK
BIG
LA
CACHE

DENDRITIC CHART OF THE SOUTH PLATTE RIVER FLOW

OCT 1964

DRY YEAR FOR PERIOD OF RECORD

DEPT. OF HEALTH EDUCATION & WELFARE
PUBLIC HEALTH SERVICE
REGION VIII DENVER, COLO

IV APPENDIX

(Other specific information is incorporated in the body of the Program Review material)

85

1. Status of Report for the Next Conference

The date for the Second Session of the Conference in the matter of Pollution of the South Platte River Basin has not been firmly established. It is likely that the Second Session will be held in the latter part of May or first of June of 1965. At present, the data which will be presented to this Session of the Conference is in varied stages of preparation. Draft copies of the Conference Report will be made available to all interested parties for review two-three weeks prior to the date of the Conference.

2. Status of Colorado Water Pollution Control Legislation

At the present time there are several proposals in the State Legislature concerning water pollution control. Two bills are in committee hearing which would bar or restrict the sale of detergents composed of ABS. Another bill proposed by the State Department of Game, Fish and Parks, would require holding tanks in conjunction with the use of toilets in boats. A number of bills pertaining to the control of ground water use have been filed in both Houses. One of the major bills would declare all ground water in and flowing into the State to be public property and subject to appropriation in accordance with the law.

The most significant item is a House Resolution, awaiting action, which would provide for a study of all existing State water pollution control laws and regulations by the Office of the Legislative Council. Since present laws involve several State Departments, such a study would undoubtedly consider the transfer of these matters to a new Water Pollution Control agency.

3. Great Western Sugar Company

The Great Western Sugar Company has previously provided excellent support to the Project in undertaking in-plant waste survey studies at six of the company mills in December 1963-January 1964. The company continued to provide additional information when requested throughout 1964 for purposes of the Project report on beet sugar mill wastes. In January 1964 a wastes survey was made of the Brighton, Colorado processing plant, with full cooperation of administrative personnel from the company. A joint meeting between the company officials, State Health Department personnel, and Project personnel is scheduled to take place before the Second Session of the Conference in order to provide the industry with findings of the previous waste surveys and need for remedial action in terms of waste control and treatment at the various mills. It is expected that the Great Western Sugar Company will give continued support in the future towards proper evaluation of the existing waste problems, and development of feasible methods to improve the quality of streams in the Basin.

The beet sugar industry is also pursuing additional lines of action. In January 1965, the Project reviewed an application for a demonstration grant received from Headquarters on "Facultative and Algae Ponds for Treating Beet Sugar Wastes." The Project at that time recommended that this research project, or a similar project, be located within the South Platte River Basin in view of the advantages offered to the study within this geographical area.

4. Consideration of Impact of Proposed Future Reservoirs and Flow Control on Water Quality

Streamflow regulation studies within the South Platte River Basin are presently handled by the Water Resources Section of Region VIII. In order that objectives of the Project will not be compromised, complete liaison is maintained between the Water Resources Section and the Project during all phases of investigation and report writing. All final reports regarding the South Platte River Basin are reviewed by the Project.

The Bureau of Reclamation is the federal construction agency for all major federal reservoirs in the Basin. Streamflow regulation studies are to be made for the following proposed Bureau of Reclamation projects:

Project	Stage	Report Due By Water Resources Section
Cache la Poudre	Feasibility	April 1965
Narrows	Feasibility	June 1965
Upper South Platte	Feasibility	July 1966
St. Vrain Unit	Reconnaissance	October 1966
La Prele Unit	Feasibility	January 1967
Julesburg Unit	Reconnaissance	December 1967

The above projects are concerned primarily with the storage of water for irrigation and/or municipal and industrial water supplies. Recreational opportunities will be provided in many of the projects. As authorized in the Federal Water Pollution Control Act, consideration must be given to include storage in these reservoirs for the purpose of streamflow regulation for water quality control. The present high consumptive use of water (mainly irrigation) combined with an ever increasing need for more municipal and industrial water results in a limited amount of water of suitable quality being available for streamflow regulation. The problem is further complicated by the fact that the State of Colorado does not recognize streamflow regulation as a beneficial use of water. Because of these factors the practical application of streamflow regulation as a means of water quality control in the Basin appears to be limited.

The proposed projects shown above if undertaken, would have the effect of imposing full control and regulation of Basin waters from the headwaters to the Colorado-Nebraska Stateline. The average yearly streamflow would likely be reduced throughout the area as a result of these projects. Incidental benefits may occur to water quality control when flow releases are made for other uses during times of low flow. However, conditions may also be further aggravated if the demands (and releases) for other uses do not correspond to times of critical water quality needs.

Optimum utilization of water within the Basin will probably require tertiary waste treatment as the main means of water quality control.

During FY66, the Project anticipates a short-term economic study designed to further define the areas of heavy water use in the future and to establish more suitable criteria for judging effects of future impoundments on change in stream water quality.

5. Investigations on Quality of Headwaters of the Basin

Water quality surveys for the third Project study area, which includes the headwaters of the mainstem South Platte River above Denver, are not scheduled to be undertaken until FY67. The mountain streams above Denver sustain relatively small populations and no industry exclusive of scattered mining operations. There have been no gross water pollution problems reported in the headwaters region up to the present time and for this reason, stream studies within the headwaters area are not scheduled until the last year of Project field activities. The Project, nevertheless, is not completely without information on the quality of water resources in the area. Biological studies were conducted in the last part of FY64 on the upper South Platte River, South, Middle, and North Forks of the South Platte River and on Tarryall Creek as part of the Basin-wide network of biological stations. Unfortunately, the operation of the biological sampling network was stopped when the Project Biologist resigned in the first quarter of FY65. This operation will be resumed in the near future. The biological studies on the headwaters did indicate that mining operations were expanding in the Basin and dredging operations associated with mining could create significant water quality problems in certain headwater streams. If indicated by the FY66 biological studies of the Upper Basin streams, adjustments will be made in overall Project plans to divert adequate manpower forces into this area ahead of the proposed time schedule.

6. Consideration of High Gastroenteritis Rates

During the 1963 Conference concerning the South Platte River Basin, Dr. R. L. Cleere, Director, Colorado State Department of Public

Health, discussed enteric diseases in his statement. These general remarks referred to water-borne diseases which could result from pollution of municipal water supplies. The Project has conducted an evaluation of selected public water supplies in the Metro Denver area and will extend this program to the remainder of the Basin. One of the supplies studied by the Project in 1964, Northwest Water Corporation, was also investigated in 1963 by Dr. Graham Walton, SEC, at the request of the Colorado State Department of Public Health. At that time Mr. R. C. Barnes, Chief, Communicable Disease activities, PHS, Region VIII, Dr. C. S. Mollohan, Chief of Epidemiology, CSDPH, and Mr. James Eagen, General Engineering Consultant, Division of EEFP, PHS, Region VIII, considered conducting a study regarding enteric diseases in Adams County. Since that time this study has not been pursued further. Mr. Barnes and Dr. Mollohan have recently indicated that in their opinion the gastroenteritis in this area is commonly associated with food rather than with water supply. This opinion is based on their analysis of improved morbidity reports.